VOL. XI, No. 3 SEPTEMBER 1945

THE TOOL ENGINEER

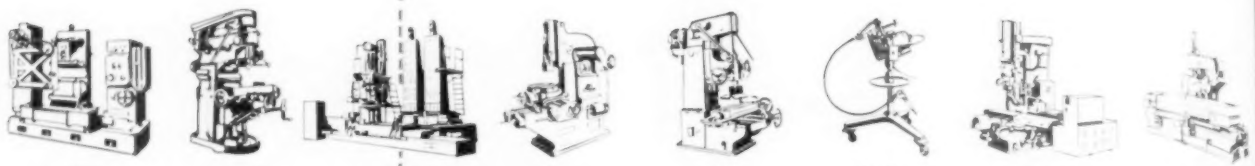
OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS

Departments

Behind every manufactured product is the tool engineer

A message

to "the men who make dreams come true"



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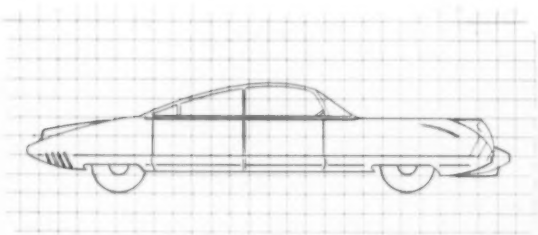

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"There is no better-paying investment than the right tools for the job"

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Die- and Mold-Making Equipment

Futuristic car, courtesy THE IRON AGE

The Tool Engineer

Official Publication: American Society of Tool Engineers

Sept., 1948

Vol. XXI, No. 3

Editorial

The Truth Is on Our Side

SINCE THE INCEPTION of the organization, members of the American Society of Tool Engineers have talked about the wonders of mechanization in industry, and have time and again cited facts and figures to prove that this phenomena has resulted in increased employment.

Our contemporaries in thought, as individuals and as members of organized groups, have done the same. We have thought we were spreading a message—correcting a fallacy, but now something has come up to indicate that we have largely been talking to each other about a topic in which we were already in accord.

A recent study, made by the Psychological Corporation in a nation-wide, urban public opinion poll, reveals that *45 percent of the public believe the economic fallacy that machines reduce the number of jobs.*

The poll indicated that 48 percent of the people realize that mechanization will increase employment and that seven percent were uncertain.

The question asked was:
"Do labor saving machines like steam shovels, cotton pickers, power lawn mowers, etc., increase or decrease the number of jobs *in the long run?*"

You will note that the question did not ask for immediate effects of new machinery. The survey included 2,500 personal interviews made by 393 interviewers in 148 cities and towns throughout the country.

It is interesting to note the variation of opinion among people in different classifications. Of the unskilled workers, 55 percent believed machines cut jobs. The skilled workers were the average with 45 percent so believing. Thirty-nine percent of the white collar workers and 38 percent of the owner-management group felt that mechanization means reduction of employment in the long run.

The extent of this fallacious belief is at once incredible and shocking. Perhaps it is to be expected of the hourly-wage workers who are almost inevitably directly affected, in the beginning, by any change over to labor-saving devices. But it is startling to find that only 57 percent of the owner-management group is convinced that mechanization does increase employment in the long run.

No one will deny that labor-saving machinery has been utilized more fully in this country than in any other. Yet today, the United States has the highest employment rate in its history.

On the basis of these two facts alone it should be obvious that mechanization has not cut employment. When we see evidence among people who are cognizant of these facts, as the owner-management group must be, that the old fallacy prevails, it is obvious that we have before us a tremendous problem of education. Common acceptance of machinery as a boon to humanity is of prime importance to every tool engineer.

Correction of this fallacious way of thinking is one of the most valuable contributions we can make to industry and for our own good. This is a big and important goal. It cannot be attained in a single day. It is something toward which we can work —and with the truth on our side!

I. F. Holland

President 1948-49

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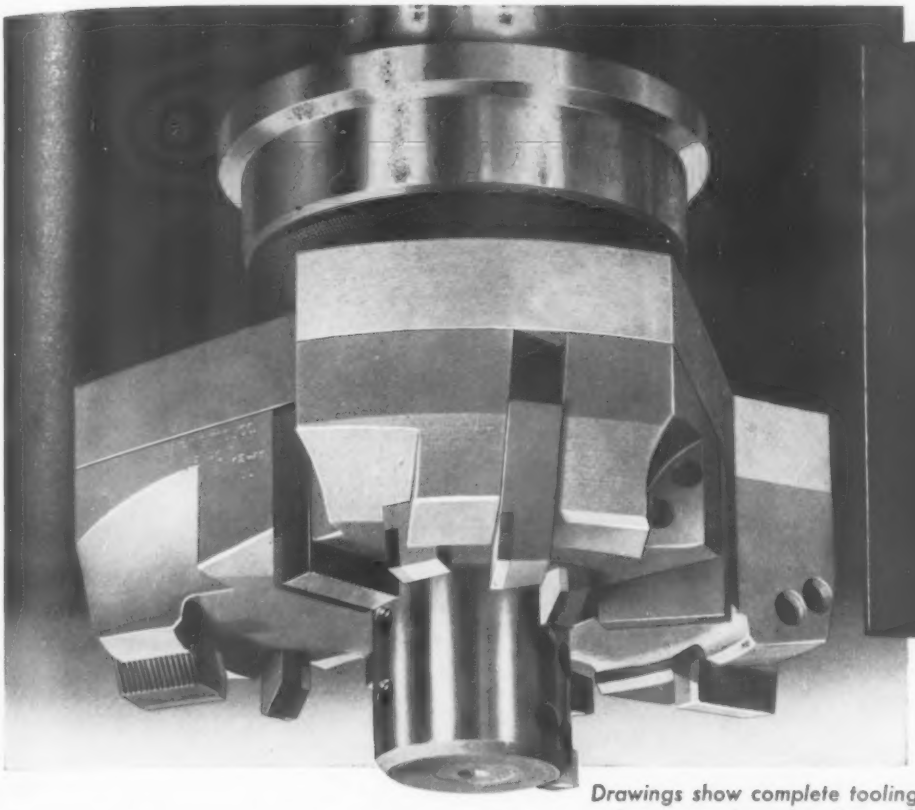

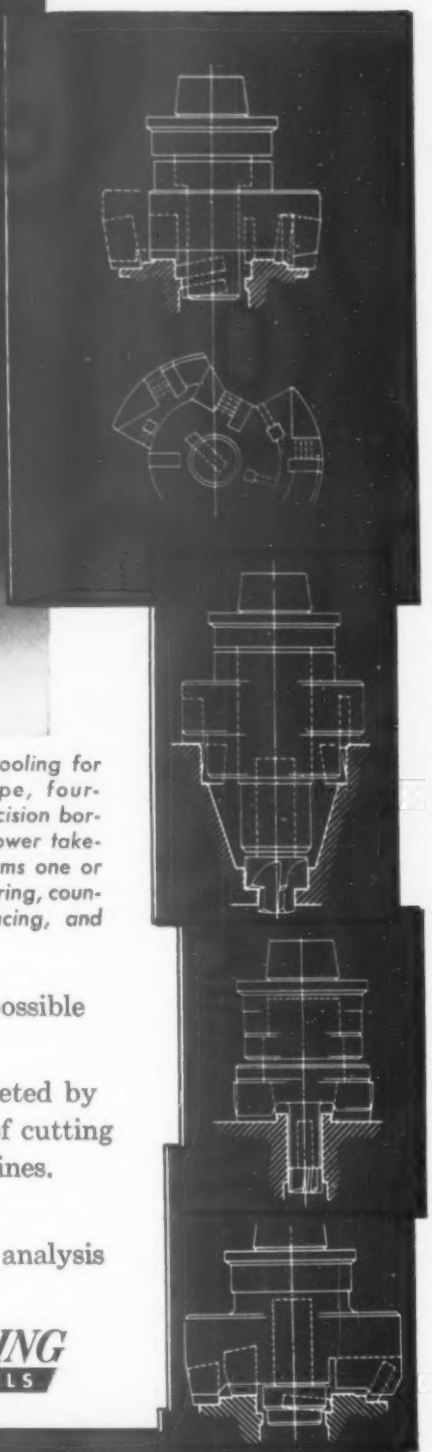

Drawings show complete tooling for a two-way, trunnion-type, four-spindle, roughing and precision boring machine, producing power take-off units. Each tool performs one or more operations such as boring, counterboring, chamfering, facing, and hollow milling.

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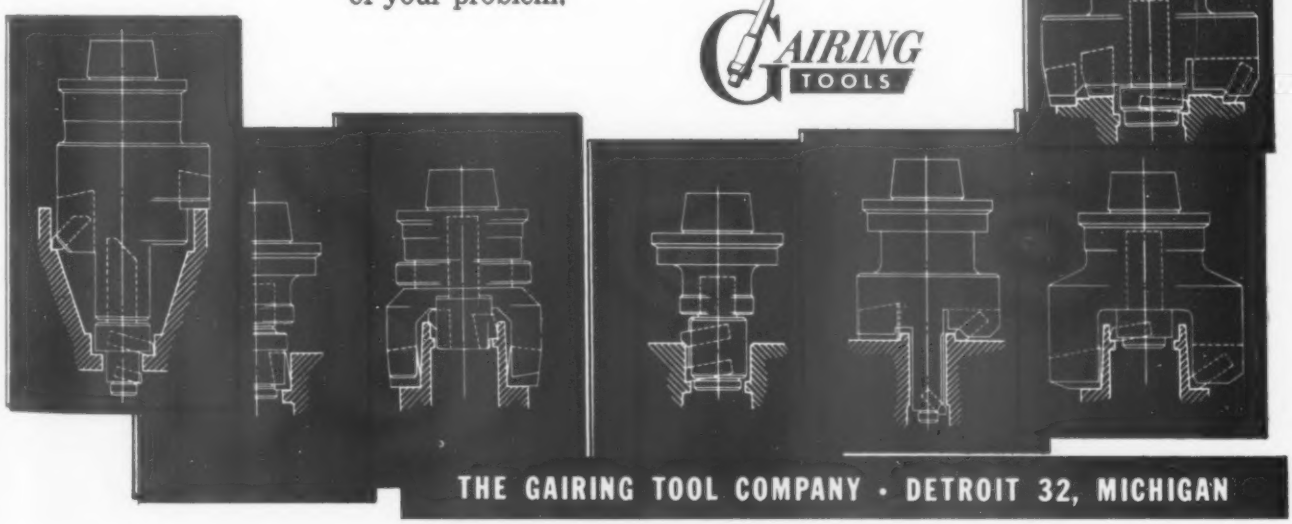

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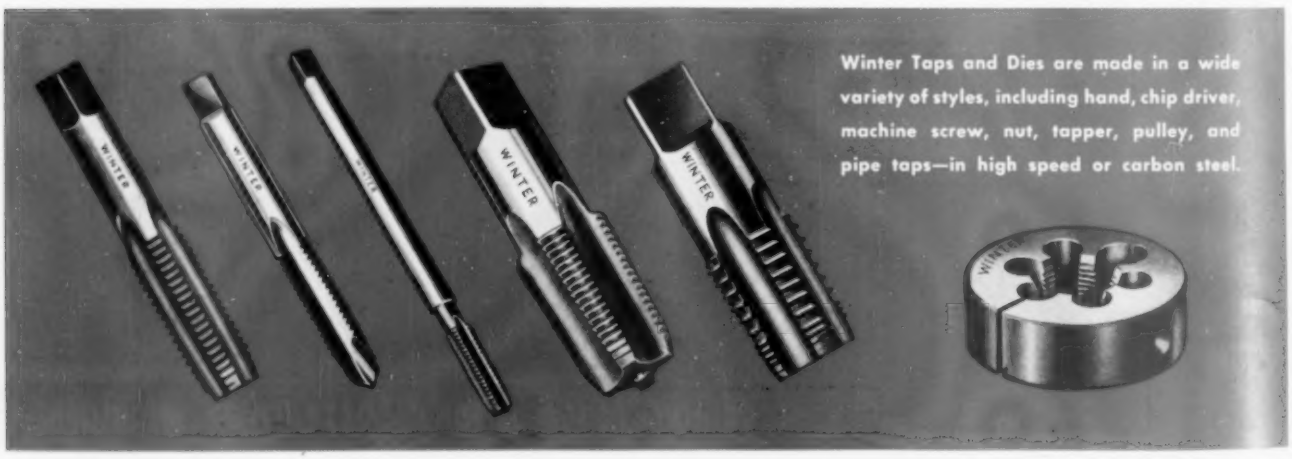

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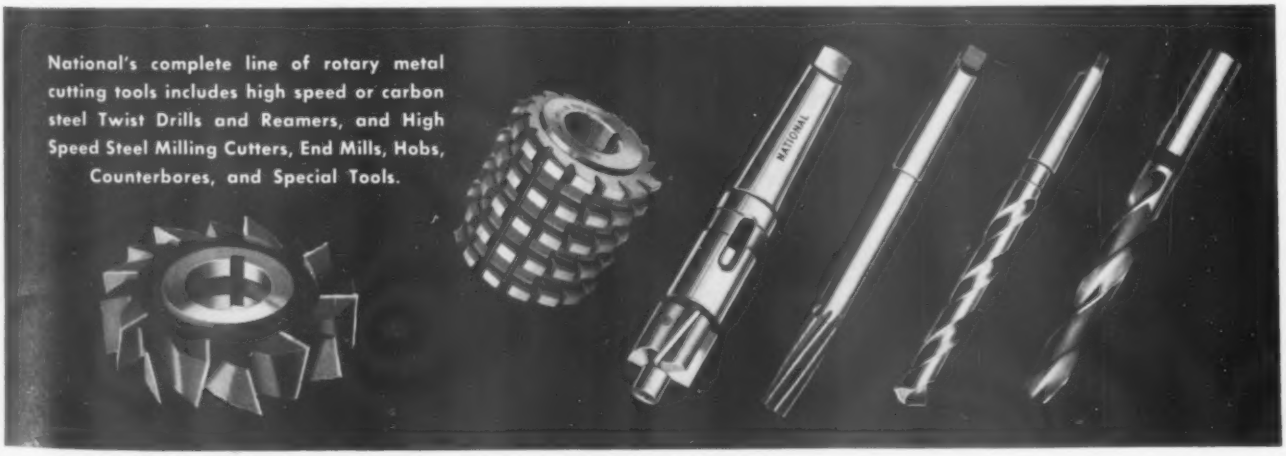

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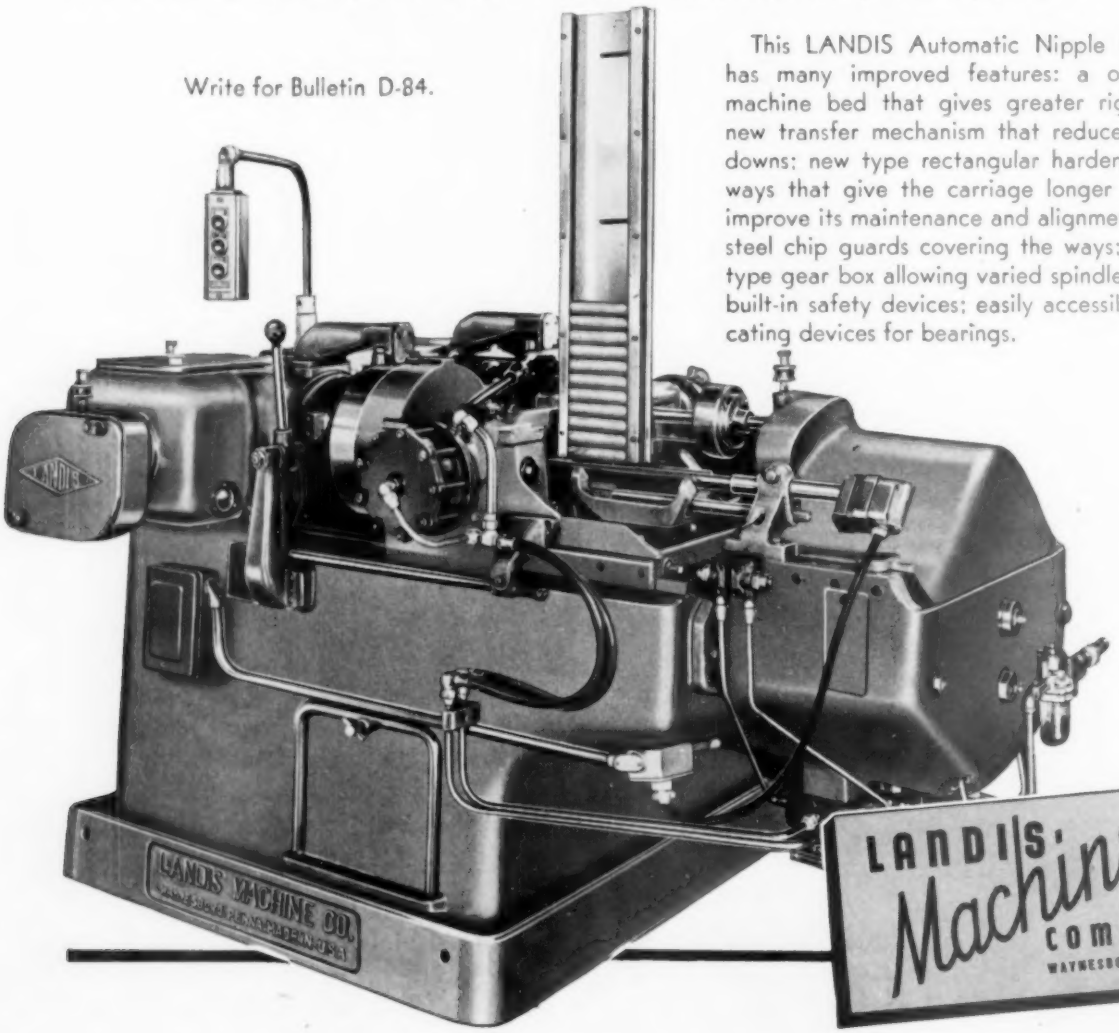
LANDIS Announces THE IMPROVED AUTOMATIC NIPPLE MACHINE

The improved LANDIS Automatic Nipple Machine threads, reams, and chamfers nipples on both ends in a continuous automatic operation, eliminating secondary manual handling. Two nipples are completely machined on one end during the operation cycle. The semi-finished nipple is transferred end-to-end from the right-hand to the left-hand carriage by mechanical fingers for the operation on the opposite end. Finished nipples are ejected automatically.

The machine is built in two size ranges—one includes nipples from 1/2 to 3/4" pipe size and lengths from 2 to 6"—the other includes 1 to 2" pipe sizes with a maximum nipple length of 6". Production ranges from 200 to 625 per hour, depending on the pipe size.

Write for Bulletin D-84.

This LANDIS Automatic Nipple Machine has many improved features: a one-piece machine bed that gives greater rigidity; a new transfer mechanism that reduces breakdowns; new type rectangular hardened steel ways that give the carriage longer life and improve its maintenance and alignment; sheet steel chip guards covering the ways; pick-off type gear box allowing varied spindle speeds; built-in safety devices; easily accessible lubricating devices for bearings.



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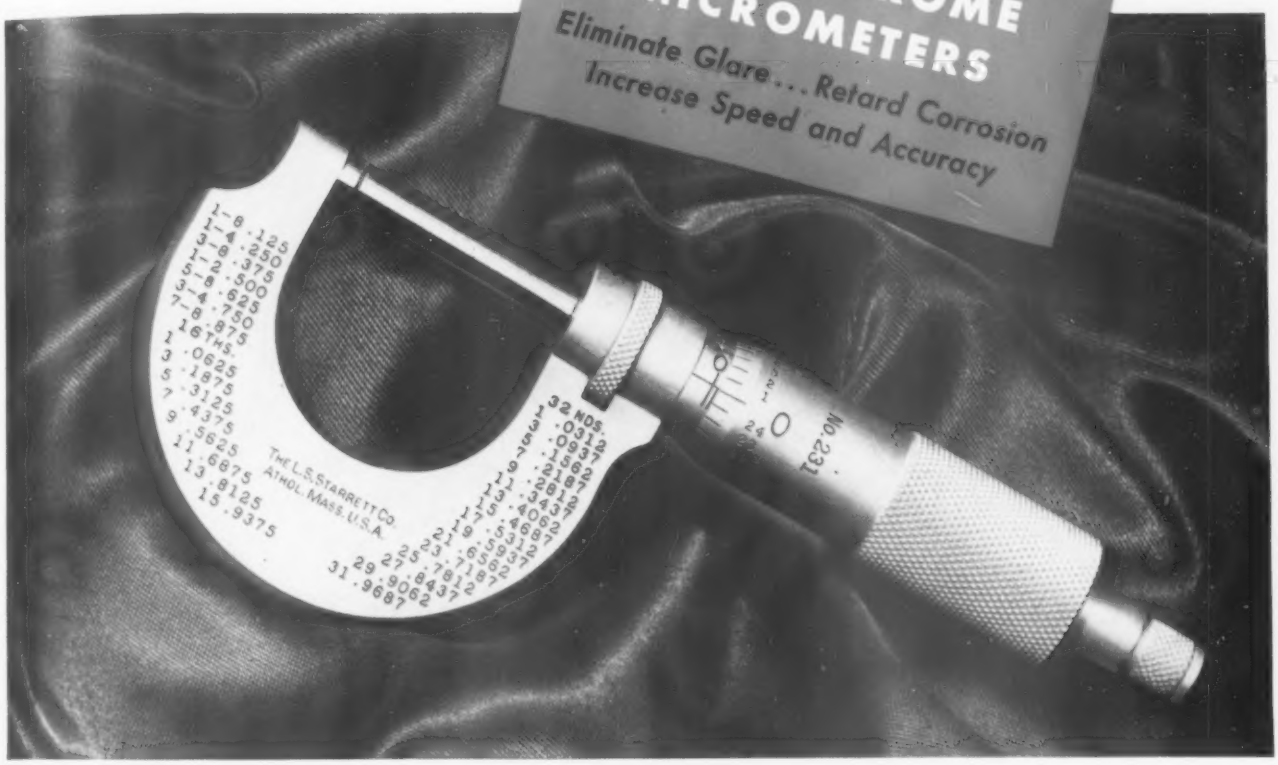

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- Simple Adjustment for wear.

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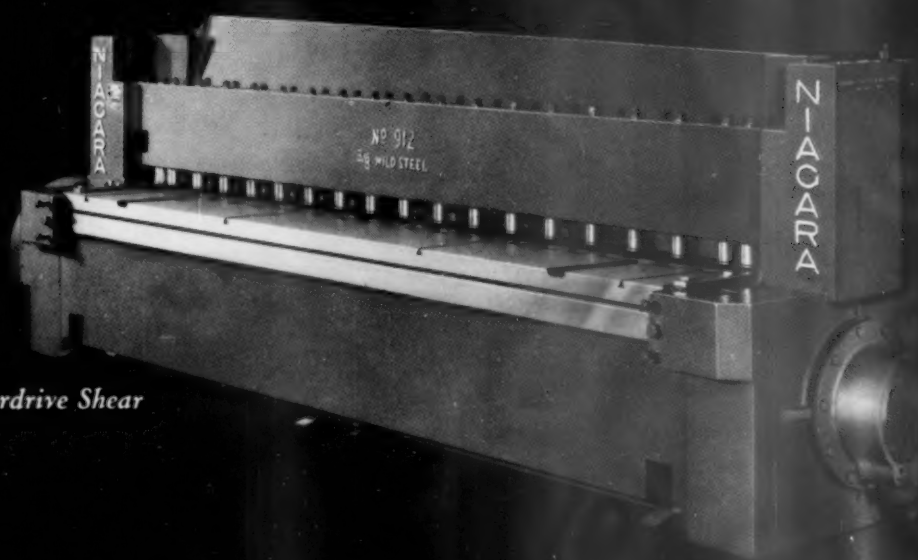
Niagara Double Crank Press

Niagara Deep Throat Press



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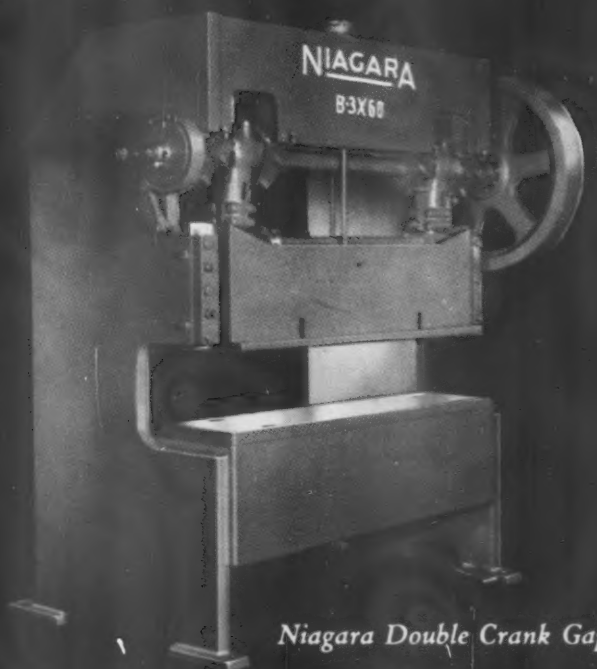

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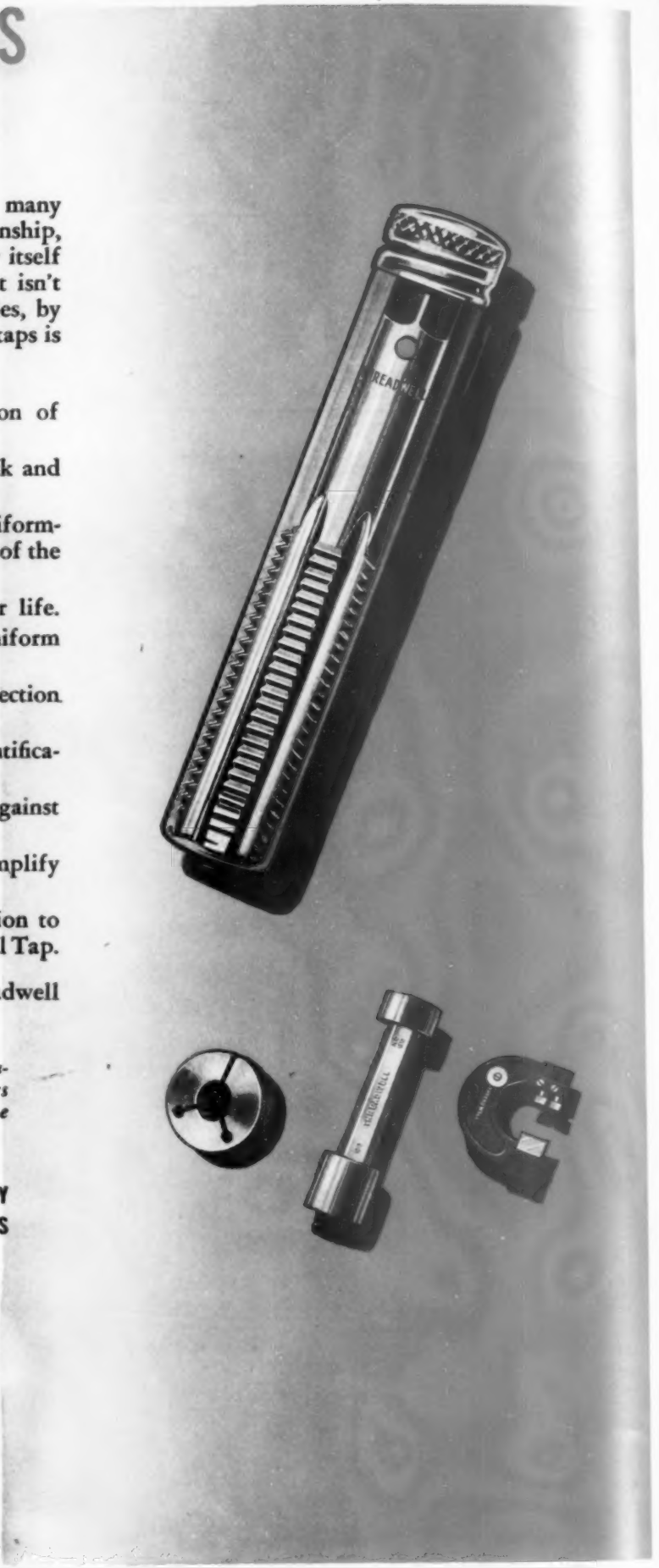


Threadwell

"TOOLS OF DISTINCTION"

Automatic Hoppers Speed Assembling

By A. E. Rylander

Similar as well as dissimilar parts may be selectively fed by mechanized hoppers

HOPPERS, OF WHICH the simplest form is the common funnel, are now being applied to a broadening range of uses throughout industry to cut costs of manufacture. They may be had as simple bins with open or gated discharge orifices, as entirely self-contained, mechanized units for attachment to a wide variety of manufacturing equipment, or, they may be incorporated into designs of special purpose machines in which the hopper may be the major or minor component, depending on the work being processed. However used, they materially reduce labor costs in repetitive handling of parts.

Four Types in Common Use

The four types most commonly used are the open bin, the gated bin, both of which are shown in the drawings, Figs. 1 and 2; the rotary, of which a typical example is shown in Fig. 3; and the "centerboard." The open bin type is largely used in press rooms where, placed adjacent to a punch press, an operator is enabled to pick up parts from a tray which, located at convenient height, is kept supplied from the accumulation in the hopper.

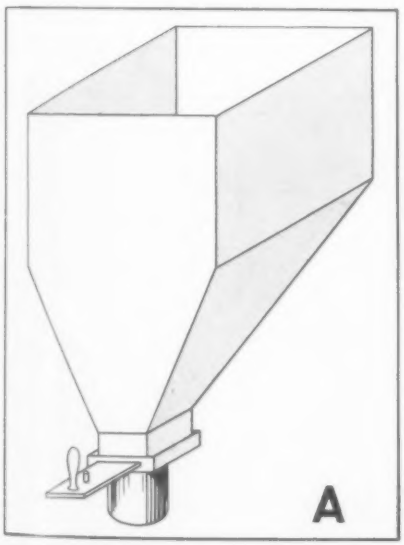
The gated hoppers are used in grist mills or in industries which handle powdered or granular materials. As developed for modern uses, they may incorporate weighing scales and measuring devices. Thus, a battery of hoppers may be used in a bakery, one to deliver wheaten flour, another rye, another graham, and these ingredients are weighed in proportions desired while water, milk and leavening are each metered in desired quantities. In rubber mills, sulphur and other powdered substances may be likewise weighed or otherwise metered for subsequent mixing.

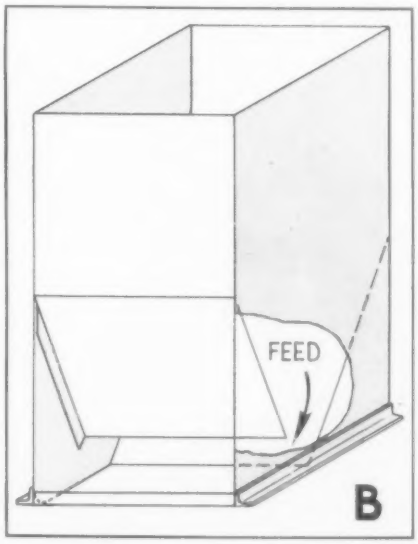
The centerboard type—not shown—is largely used by manufacturers of screws and cold headed products, by whom it is favored because of its simple action. This hopper incorporates a hinged, vertically reciprocating plate largely similar to the centerboard of a sailboat, from which it takes its name. The hopper is V-shaped, with the plate—which has a longitudinal slot—at the convergence of the Vee.

The plate rocks in its hinge. On the down-stroke the parts drop into the slot, which is then in horizontal position; then, at the top of the up-stroke, the slot is sharply inclined, when the parts slide down by gravity into a discharge chute. A rapidly rotating kick-off, shaped like a coarse-toothed milling cutter, rejects parts improperly positioned in the slot and prevents jamming. A particular advantage of this type outside of its simplicity, is the comparatively large capacity of the hopper.

The rotary type, which is the most highly developed and of which several makes are commercially available, has a somewhat lesser hopper capacity but, in compensation, provides speed with fine selectivity. This type may be used with welding machines to feed clinch nuts or other parts, to feed small parts into drilling and tapping machines; for feeding parts into automatic inspection machines; for rivet insertion and clinching, as shown in Figs. 4 and 5; in combination with automatic screw driving equipment; and, among many other things, for feeding one or several parts to automatic assembling equipment.

There are, however, certain types of parts which are not readily selectable for position—as, for example, slotted headless set screws, which are difficult to feed with the slotted end up. In such cases, hoppers may be omitted entirely, the screws being dumped on a tray track by the operator, pushed into the slot, as shown in Fig. 6. Here, screws are being driven into a V-pulley with an automatic screwdriver. However, this is an exceptional case, and hoppers may be advan-





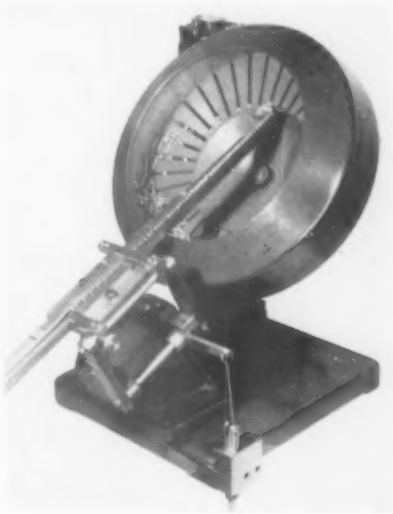
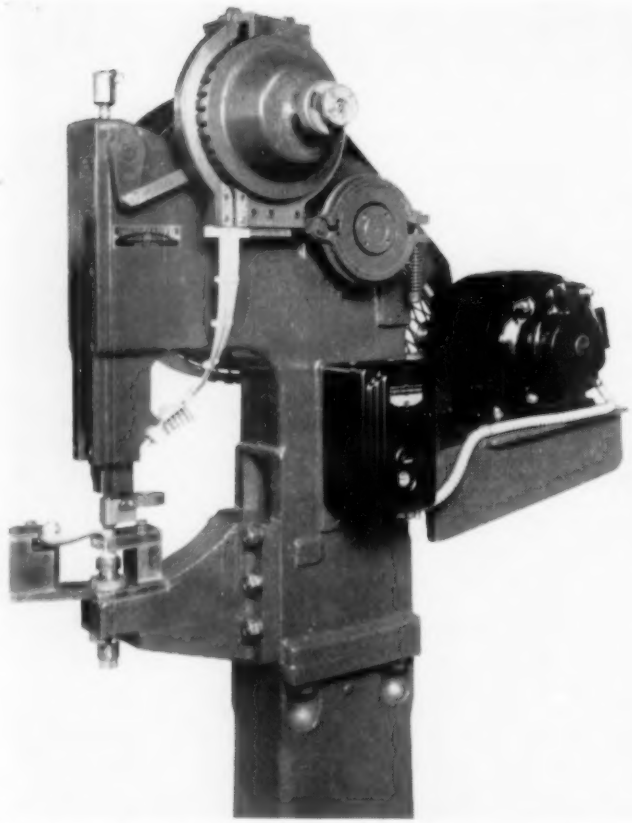


Fig. 1, at left, a simple bin-type hopper provided with a manually operated gate, here shown in open position. Hoppers of this type are used in grist mills and industries handling powdered or granular materials. Fig. 2, center, shows a simple bin-type hopper such as used in press rooms. Parts flow by gravity into the tray, which is placed at convenient height for the operator. Fig. 3, at right, a motor-driven rotary hopper, such as manufactured by Detroit Power Screwdriver Company. Hoppers of this type have fine selectivity and are designed for use with a wide range of manufacturing equipment. The hopper shown is equipped with a counting device designed to deliver a predetermined quantity of screws or similar parts at one time. Action is clearly indicated in the photo. The parts fall into slots in the rotor, which turns clockwise, and fall into the track when the slot is in vertical position at top. Overflow, as well as parts improperly positioned, fall back into the hopper.



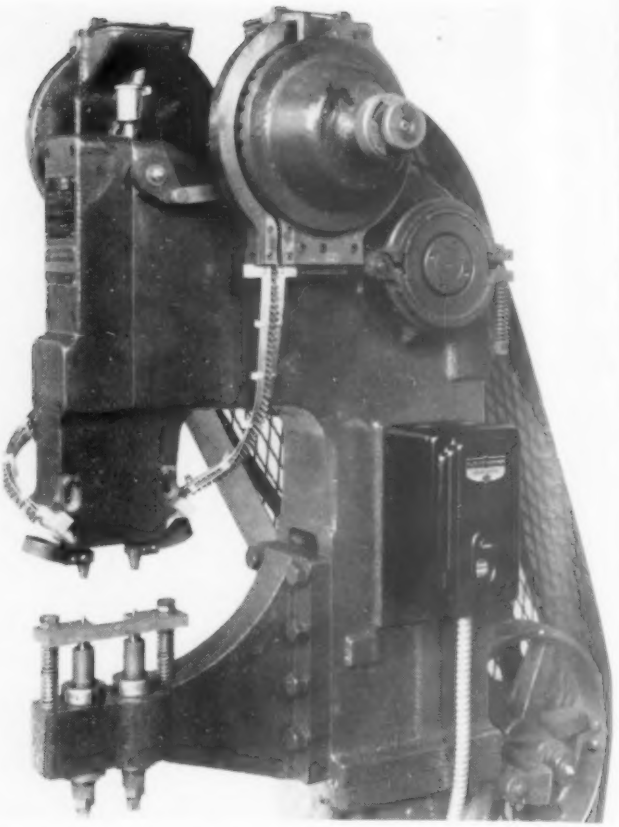
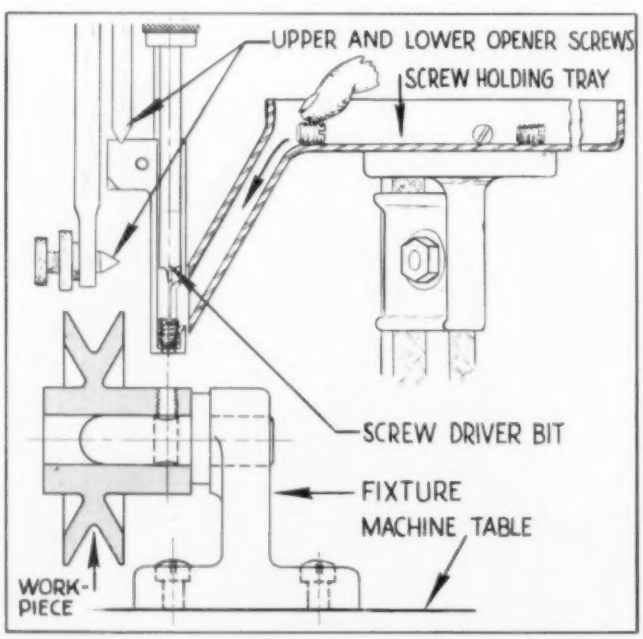


Fig. 4, at left, a rotary hopper applied to a "Rivitor" riveting machine tooled to assemble automobile window regulating knob and crank. Fig. 5, at right, "twin" Rivitor, provided with two hoppers, tooled to rivet buckets to conveyor chain. In both of these machines the rivets are hopper fed to the work and automatically inserted and clinched. Photos by courtesy of Tompkins-Johnson Company, Jackson, Michigan.

tageously used even in applications of this kind since the tray can be recurrently filled, as fast as required, by means of automatic hopper feed.

On the other hand, round-end rectangular-shaped hollow shells may be hopper fed with accurate selection, as shown in Fig. 7. If the parts come open end first, they slip over the pin in the index wheel, and are then delivered closed end first into a second chute, as shown at A. Should they come closed end first, they are stopped by the pin and fall into the space between pins at the next index, as shown at B. They will then drop out between the wheel and guard, to be caught in a suitably disposed container. A detent, operating in synchrony with the index wheel, provides one-at-a-time feed of parts.



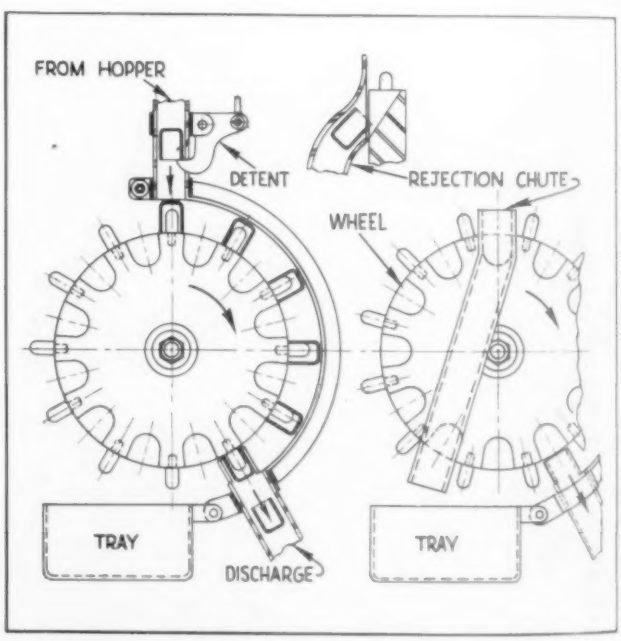
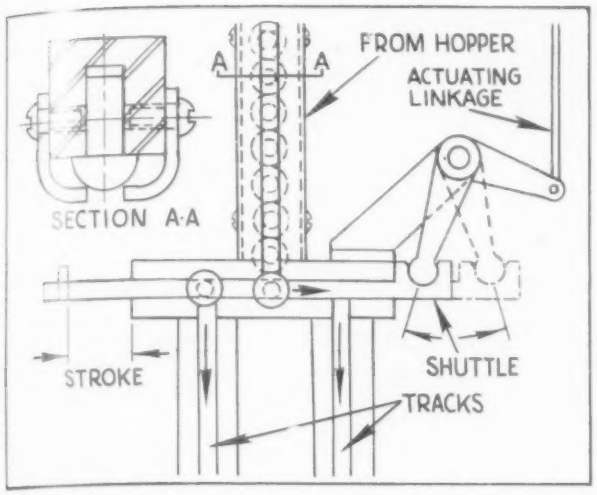


Fig. 6, at left, shows feeding of parts, such as headless slotted set screws, that are not readily selected end for end. Such parts may be hopper fed to the tray in quantities to maintain a supply, and then positioned slot-end up by the operator. In this case, headless set screws are being driven into a small V-pulley. Illustrations by courtesy of Detroit Power Screwdriver Company. Fig. 7, at right shows how hollow shells may be positioned. If coming open end down they nest on the pins and are later discharged closed end down, as shown at A. Should the shells come closed end first, they are momentarily arrested by the pins; then, at next index of the wheel, fall down into a tray, as shown at B. This method could also be used for selective feeding of hollow set screws.



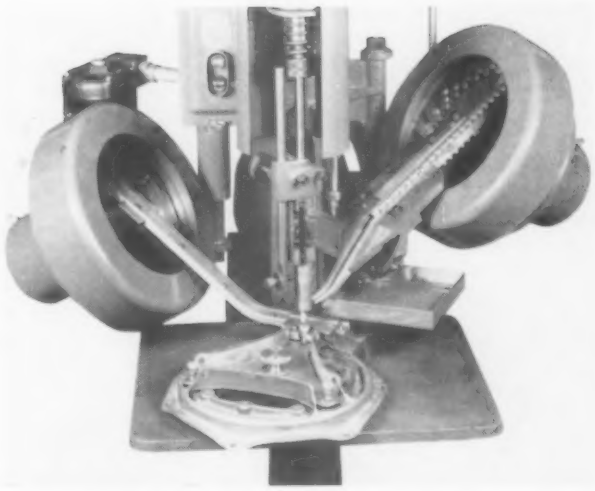


Fig. 8, at right, shows how parts may be diverted from a single to dual tracks by means of a shuttle operating in synchrony with the machine stroke. On the down-stroke of the bell crank (or at leftward stroke of the shuttle) parts fall into the left hand track and, on the up-strcke, into the right-hand track. However, shuttles multiply the discharge rate of a hopper, and for that reason it is preferable to use separate hoppers for each part, as previously shown in Fig. 5, and in Fig. 4, at right above. In this case, hex head screws and hex jam units are fed from separate hoppers and both are automatically pre-assembled after which the screw is automatically driven into the clutch plate shown. Photo by courtesy of Detroit Power Screwdriver Company.

While it is usually preferable to provide one hopper for each driving unit, there are times when space limitations demand holding the number of hoppers in a setup to as few as possible. In such cases, the flow of parts—as, for example, rivets or screws—may be diverted into several tracks by means of a shuttle, as shown in Fig. 8. The shuttles operate in synchrony with the working stroke of the machine.

However, such shuttling accelerates drainage of parts from the hopper and thereby entails frequent refilling when parts are large. Therefore, the preferable method is to employ one hopper for each part, as suggested in Figs. 9 and 10. As may be judged from the several illustrations, the tracks may be "snaked" around obstructions, thereby facilitating the most advantageous position of the hoppers in relation to other machine components.

As previously implied, the variety of small parts that can be selectively fed by means of automatic hoppers is almost unlimited—for that matter, large accumulation hoppers may be placed over or chuted to the smaller, mechanized units for recurrent refilling. As a rule, however, the parts to be hopper fed are located close at hand, in tote boxes or bins, and may be scooped into the hoppers as supply diminishes. On fast assembling operations, the hoppers may need frequent refilling.

The versatility of the automatic hoppers may be inferred from Figs. 10, 11 and 12. Fig. 10 shows an application of assembling screws, washers and nuts in the mass production assembly of toy wagon wheels. Each part is fed to its proper location by means of the hopper, the screws to the top of the assembly, the washers underneath and the units below the washers. The nuts are prevented from turning by means of a slotted grip, and the screws are driven tight by means of the screwdriver bit which, with its torque setting, is also automatic.

Fig. 11, which shows an interesting combination of automatic hopper feed with automatic tapping, indicates excellent coordination of design together with clean lines. It is an "engineered" job throughout. The hopper is bracket-mounted directly to the machine table, thereby providing a short, straight track, and hopper escapement, fixture index and lock, as well as top traverse to work, are all air-operated and accurately synchronized.

The versatility of automatic hopper feed is further indicated in Fig. 12, in which a machine originally designed for automatic feeding and driving of screws has been revamped to assemble spring clips in automobile door handles. Here, too, the track is short and straight, and the work-holding fixture is featured by simple, easy-to-get-at design.

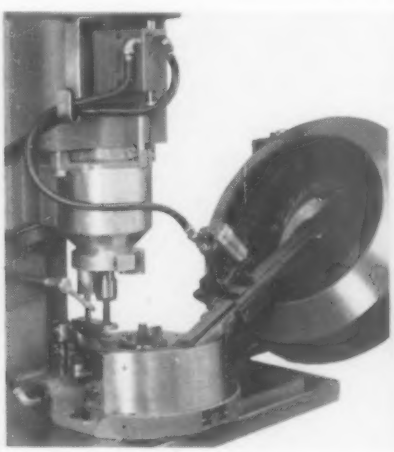


Fig. 10, at left, shows how three hoppers may be applied to assembly of wheels. One hopper feeds round-head screws, another washers, while the third feeds the nuts, each of which are properly positioned for automatic assembly. The wheels turn on a stud, and the fixture is adjustable for different sizes of wheels. Fig. 11, center, shows an interesting combination of automatic hopper feed with automatic tapping. The parts—thin shells—have an "ear" which resists the torque of tapping, and are individually fed to the index wheel, tapped and discharged. The entire machine, together with hopper escapement and operation of the fixture, is air operated. Fig. 12, at right, shows method of assembling spring clips in automobile door handles. The clips are picked up in the hopper and fed down the track, which is formed to the shape of the spring, and pushed into the fixture by a ratchet-actuated brush. The ram, actuated by a foot treadle, then presses the spring into a slot in the handle. The machine used is a revamped automatic screwdriving machine. Figs. 10, 11 and 12 by courtesy of Detroit Power Screwdriver Company.

By Arnold Hildebrandt

Automatic

THE EVOLUTION of metal spinning techniques to meet modern manufacturing requirements, since its introduction into the United States about 1840, is strikingly demonstrated in the mass production of a metal cone for a television cathode ray tube spun from a presumably non-spinnable metal.

Regardless of quantity, some shapes lend themselves more economically to production by metal spinning than by any other method. Among these are special reels which, if produced by stamping, would require butt welding or overlapping; deep conical shapes; extremely large diameter parts such as 96" diameter tank heads and radar antennaes; and some special types of street lighting reflectors demanding absolutely scratch-free inside surfaces. The same principles used in hand spinning methods have been adapted to semi-automatic and automatic setups which have projected the process of metal spinning into the field of economical mass production.

Even before the development of the roller-type spinning tool, shown in Fig. 1, the spinning of heavier industrial parts was undertaken in an attempt to prove that metal spinning could efficiently be extended beyond the production of such items as bric-a-brac, bases, and lighting fixtures. The development of the roller tool was a step forward since, besides the pressure exerted by the spinner himself, one or more helpers could be added to the lever to double or triple the application of pressure. In this manner, intricate shapes and extremely large and deep parts of heavy gage metal were spun.

For the successful spinning of stainless steel, special techniques and skill were developed that, eventually, permitted the manual spinning of 96" diameter standard ASME storage tank heads out of No. 12 U. S. Gage Type 304 stainless steel —although still by hand pressure methods, as indicated in Fig. 2.

Although results were acceptable, experiments conducted led further toward the achievement of greater smoothness and uniformity. A setup, shown in Fig. 3, was designed and perfected which now mechanically spins heads of diameters up to 102".

Type 302 Stainless Steel—18% chrome, 8% nickel—has been satisfactorily spun into shallow shapes for many years. The same alloy with 0.08 per cent maximum carbon, designated as type 304, works well on deeper shapes commonly spun. In recent years when ordering stainless steel for spinning purposes a free-spinning quality was commonly specified. This analysis has a somewhat lesser chromium content and a little more nickel than type 304, and is now officially named type 305. In certain cases, Type 347 and Type 430 have also been satisfactorily spun.

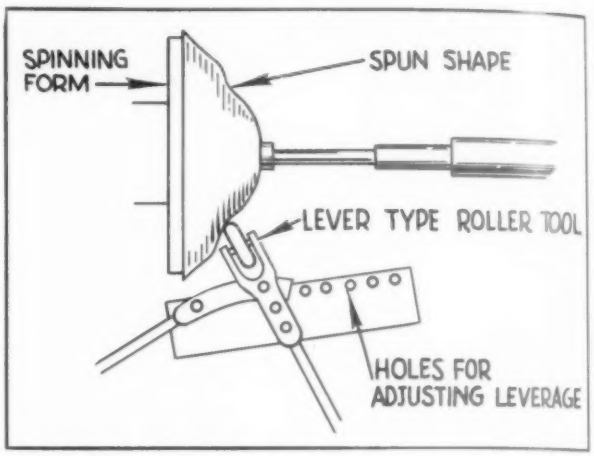


Fig. 1—A typical lever-type roller spinning tool. Holes in base plates permit adjustment of leverage as well as for various diameters of work.

Arnold Hildebrandt **has had long, intensive experience in all phase of spinning. Beginning at the Lathe, he has held successive positions as Production Manager, Field Engineer, Chief Estimator and Advertising Manager for the Milwaukee Metal Spinning Company (Spincraft). He is listed in the ASTE Speakers Directory as available for lecture on "Modern Methods of Metal Spinning."**

Direct-view vs. Screen-projection Television

A recent problem confronting television tube engineers involved a severe forming operation with Type 446 Chrome Iron stainless steel. The critical part was a cone, shown in Fig. 4, for a television cathode ray tube. One end of this tube has a slightly convex glass disc which, actually, is the television screen. When first considered, production by the spinning method seemed out of the question; today, however, a highly perfected part is being turned out on a mass production scale.

As of February 1, 1948, there were 257,000 television sets in use in this country, and it is expected that 1,000,000 sets will be in operation by the end of the year. Although televi-

Fig. 2, at left, old method of spinning 8-foot diameter, No. 12 U. S. Gage storage tank heads from Type 304 stainless steel. A changeable fulcrum roller-type lever tool is used, requiring hand pressure by the spinner and helpers. Fig. 3, at right, shows the new mechanical method of spinning the same tank head shown in Fig. 2.

Spinning of Stainless Steel

Television Needed a Tough Material to be Fabricated in a Difficult Shape

sion sets are proving very satisfactory, engineers and manufacturers realize the need for immediate improvement. The size of the picture itself is a major concern since the public considers the screen on moderately priced sets too small for completely comfortable viewing.

The televised image obtained thus far has been produced on two different types of screens. On the "direct view" screen, the viewer looks at a bright, clear image appearing on the front face of the main tube itself. These tubes have commonly been made in 7, 10 and 12 inch diameters. The other type is the "projection method" in which the image appearing in the tube is magnified and reflected on a larger screen, about 18 x 12 inches. Some definition of the image is lost through this projection. Another disadvantage is that, unless the projected picture is seen directly from the front, it fades almost completely out of sight.

Type 446 Difficult to Spin

Television manufacturers, well aware of the demand for a larger "direct view" picture, made up a 16-inch all-glass tube of the conventional type. However, this proved to be extremely costly and was also objectionable from the standpoint of weight.

It was discovered that stainless steel Type 446 and the glass used on regular tubes had identical characteristics for tube applications. The coefficient of expansion is approximately the same for both, and so, a method was developed of "fusing" the glass face and tail piece to a conical section of Type 446 material. Several experimental pieces were made up by crude production methods, but the large image obtained was very satisfactory.

The problem involved was to find a way to produce these cones in large volume and of this tough material a 23-30% chromium alloy type of stainless steel, ⅛ inch thick. Due to the contour of the part and the type of material demanded, the draw press was impractical, as is frequently the case when trying to produce deep conical shapes by this method.

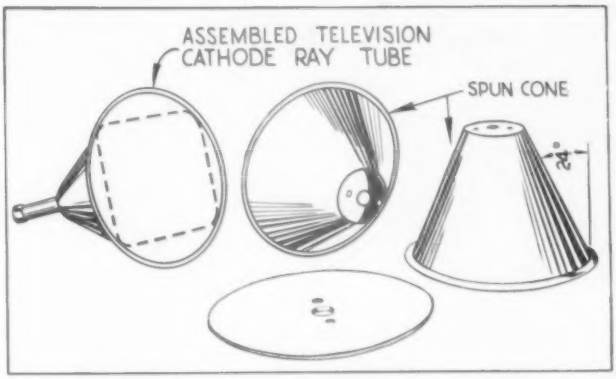


Fig. 4.—A television cathode ray tube. The glass disc, which forms the screen, and the glass tail-piece, are "fused" to the conical spun section. The surface of the cone is glass-smooth. Dotted lines show television screen as it will be masked off by the cabinet.

A process utilizing a preliminary spinning operation and a finishing operation in the draw press produced some satisfactory cones, although in limited quantities.

A few years ago, an automatic spinning lathe was developed which formed deep cones, having varying angles, diameters and depths from flat discs of various gages of stainless steel, in one pass of the roller tool. While this looked most interesting at the time, the metal used was type 305—a good spinning quality stainless steel. However, the problem before television engineers was the forming of a ⅛ inch thick 24-degree angle truncated cone, over 11 inches deep—and out of a presumably non-spinnable metal.

A table of chemical analyses, adapted from Republic Steel Corporation's "Base Prices and Extras, February 27, 1947," explains why Types 302, 304 and 305 lend themselves readily to metal spinning. The high chromium content, and the absence of nickel, explain in part why Type 446 complicates the spinning operation.

It must be kept in mind, also, that in manual spinning the metal is pampered—that is, worked carefully back and forth to the outer edge. Preliminary breakdown operations are necessary in deep shapes. In the case of stainless steel, the metal work-hardens rapidly and frequent annealing operations are necessary to restore it to a ductile condition. For example, the official description of Type 446 Stainless Steel

AISI Type No.	302	304	305	446
Carbon	over .08/.20	.08 Max.	.12 Max.	.35 Max.
Manganese	2.00 Max.	2.00 Max.	2.00 Max.	1.00 Max.
Phosphorus	.04 Max.	.04 Max.	.04 Max.	.04 Max.
Sulphur	.03 Max.	.03 Max.	.03 Max.	.03 Max.
Silicon	1.00 Max.	1.00 Max.	1.00 Max.	1.00 Max.
Chromium	17.00/19.00	18.00/20.00	17.00/19.00	23.00/27.00
Nickel	8.00/10.00	8.00/11.00	10.00/13.00	
Other Elements				N_2O

Fig. 5.—A flat disc of ⅛" thick Type 446 Chrome Iron—a type of stainless steel—is clamped to the form or "block."

reads as follows: " . . . only suitable for applications not involving difficult fabrication . . . Because of its high chromium content it is less ductile than other stainless alloys and consequently is difficult to draw, spin, form or weld."

The opinion of experienced metal-spinning craftsmen was that this metal was "like glass," meaning that it would wrinkle and fracture at the first firm stroke of the spinning tool. However, it was believed that, with the proper setup, this metal could be "run up" into the desired shape in one operation. A special automatic spinning lathe was therefore designed and built which, during experimental operations, produced surprisingly little scrap. During the preliminary try-out, minor adjustments were made and spinning speed and tool pressure were brought under close control. The lathe was then "put on the line," when old-time metal spinners, some with over 30 years' experience, were treated to the heretofore unbelievable. They saw a flat disc of supposedly "non-spinnable" metal flow into a severe 24-degree angle shape, over 11 inches deep, with one continuous stroke of the spinning tools. See Figs. 5 to 8.

Compared with the common spinning methods, this operation has shown numerous advantages in terms of output, cost, time and quality of work. The previously required multiple annealing and pickling operations were completely eliminated, and these television tube cones are now being produced in various shapes, gages and sizes, and with a surface literally "as smooth as glass," at a rate of thousands per month with extremely low spoilage and rejection.

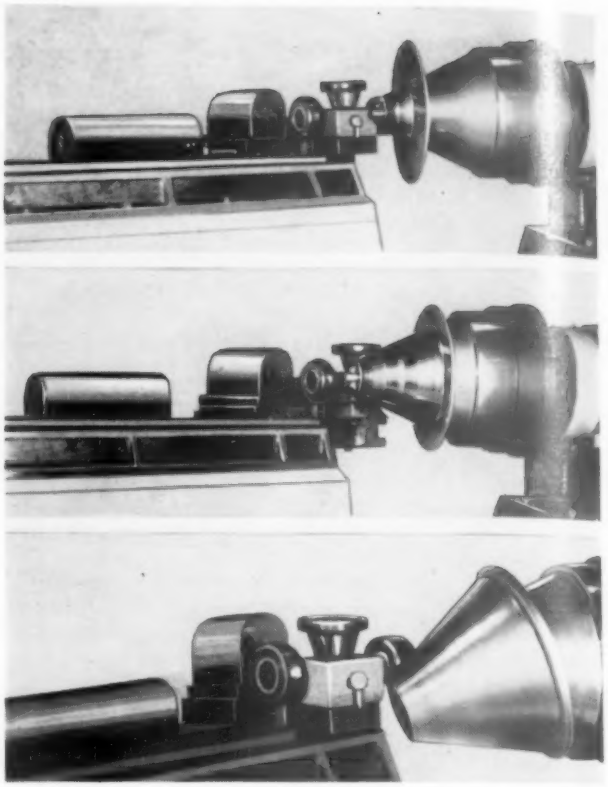


Fig. 6, at top.—Pressure is applied and spinning begins. In Fig. 7, the flat blank is formed to a depth of over 11 inches in one continuous pass of the roller tool. Fig. 8 shows the finished cone "smooth as glass" despite the severe stresses put on the metal during forming.

Assembling Machines for Tires and Wheels

A tire and wheel assembly machine, designed by company engineers, is being used by Studebaker Corporation at its new truck plant to reduce the time and toil usually required in the mounting of heavy tires. The workman at extreme left simply places the tire and rim on the lift, while it is in down position; then, by stepping on an air-pedal, raises them until they slide onto a push-type conveyor. The workman next at right places a truck wheel into position, after which the units move to a hydraulic press, shown at right. A vertical movement of the latter locks the wheel and rim, clinching the tire in one quick stroke. Except for the initial loading, the entire operation is practically automatic.

By J. W. Lengbridge

34-92000

Flow Control by Blankholder Pressure

Installment No. 4 of a Series on the Theory and Practice of Pressing Aluminum

THE THICKNESS of metal to be drawn has a direct bearing on its tendency to wrinkle or pucker, and this tendency may, in turn, be controlled if not always entirely cancelled out by blankholding pressure. It is obvious, then, that this phase of metal drawing warrants considerable study.

In Fig. 35, a long slender column at A is compared with a thick sturdy column at B, both under a compressive load. It is obvious that column A would have a greater tendency to buckle under the load than column B, and this tendency would be greater if the column was longer. Similarly, in a drawing operation, a blank which is thin in relation to its diameter will have a greater tendency to wrinkle in the areas under compressive stress than one which is relatively thick.

The formation of wrinkles, then, is natural because of the direction of the stresses, and this wrinkling—perhaps the greatest single flow retarding factor in the operation—must be controlled because of its effect on normal flow. Once the wrinkle starts, the vertical component of the compressive stress increases rapidly as shown at C and D in Fig. 35 and, as stated previously, the growth of one wrinkle raises the blankholder from the surface of the metal and allows more wrinkles to form.

High Pressure for Thin Metals

The fact that relatively thin metals have a high wrinkling tendency makes it necessary to use higher blankholding pressure, on such draws, than on draws with relatively thick metals. This is one of the reasons why limit draws should not be attempted on blanks having a low thickness-diameter ratio.

When this ratio is quite high, the metal is so resistant to wrinkling that it may be possible to have the draw without any blankholding pressure. Hence, at one end of the scale are blanks having a low thickness-diameter ratio, requiring the highest blankholding pressure, and at the other end blanks with a high thickness-diameter ratio, requiring no blankholding pressure whatever.

It may be stated, as a general rule, that as this ratio decreases the reduction percentage should be decreased also, and tools for these draws must be finished with greater care. In addition, the die and blankholder faces must be made from first quality materials, particularly if the metal being drawn is a low-strength metal. For instance, the non-heat-treatable alloys of aluminum demand hardened tool-steel dies for best results on low thickness-diameter ratio operations because of the high wrinkling tendency of these soft metals, and the need for minimum resistance to flow under high blankholding pressures.

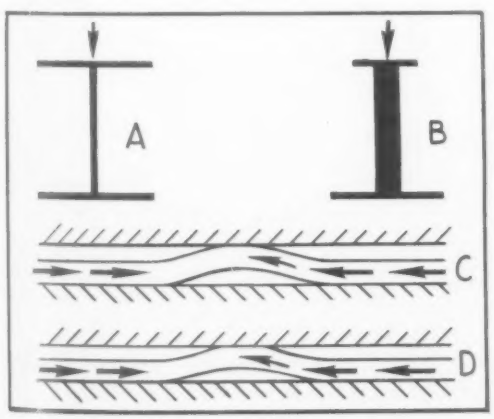
Prevention of Wrinkles & Puckers

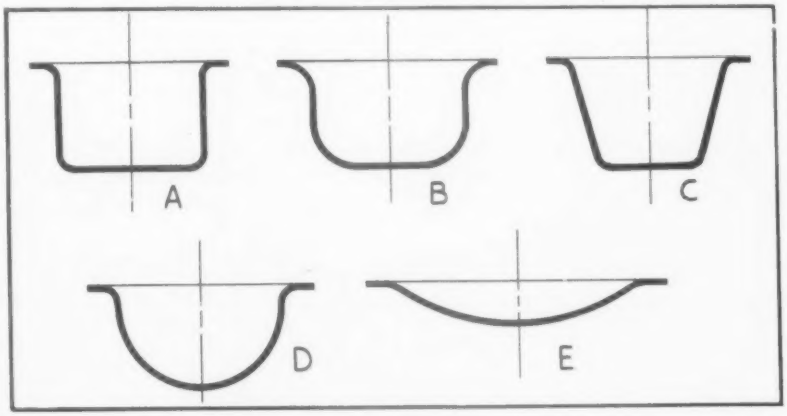
It was mentioned earlier that the shape of the shell section governs to some extent whether wrinkles or puckers will be most prevalent under conditions of poor control. It was also mentioned that straight-sided shells are typical of shapes in which wrinkling would occur, and tapered or domed shells are typical of shapes in which puckering would occur. If the die radius or radius on the bottom of the shell is too large, even though the sides of the shell are straight, the conditions come closer to domed or tapered shapes, and the result would be a tendency to both wrinkle and pucker. Greater blankholding pressure would then be necessary to maintain control.

In Fig. 36 five shells are arranged in the order of increasing blankholder pressure requirements. The shells shown at A, B, C, and D are all of equal diameter but, because of a difference in shape only, would require a different pressure to control the metal movement.

In shells A and B, wrinkles would appear if the blankholding pressure was not sufficient; in shells C and D, there would be both wrinkles and puckers. In shell E, the main trouble would be puckers because little of the metal moved is at any time in the flow area, and the true contour must be obtained by pulling the material tightly to the descending punch.

The stress diagram at E indicates the ratio of the blankholding pressure to the drawing pressure. In drawing such





In FIG. 35, a long slender column at A is compared with a thick column at B, both under compressive load. Column A would have a greater tendency to buckle under load than column B; similarly, a blank which is thin in relation to its diameter will have a greater tendency to wrinkle in the areas under compressive stress, in a drawing operation, than one which is relatively thick. FIG. 36 shows five shells arranged in the order of increasing blankholding pressures. While shells A, B, C and D are all of equal diameter, differences in shape demand different pressures to control metal movement and to prevent wrinkles and puckers. In shell E, the main trouble would be puckers because little of the metal is at any time in the flow area, and the contour must be obtained by pulling the metal tightly to the descending punch.

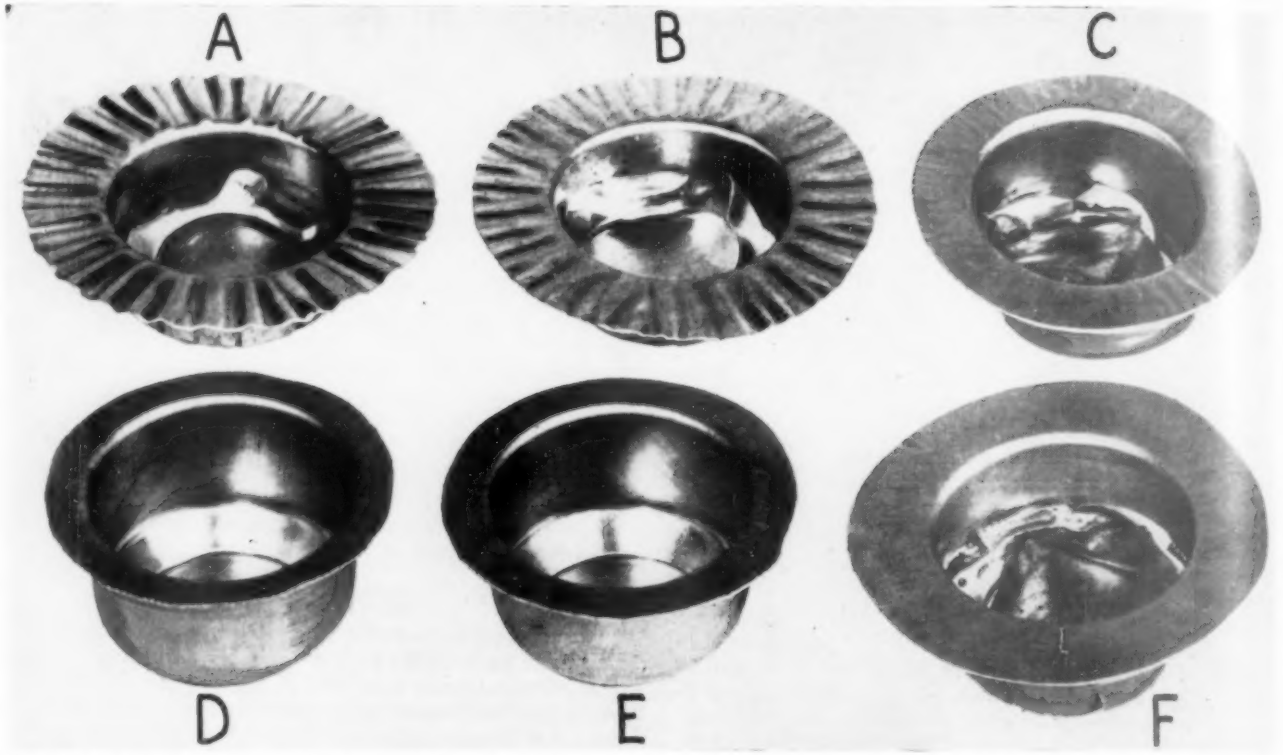


FIG. 37, showing six shells which have been drawn under as many different pressure settings. Shell A, which has a severely wrinkled flange, was drawn with too much flow space between the blankholding faces. Shell B, drawn with the blankholder adjusted closer to the die, has shallower wrinkles in the flange although these are still too deep to permit good flow. Further adjustment produced shell C, deeper than shell B because of greater flow but yet sufficiently wrinkled to cause fracture. Shells D and E were the result of successively reducing the blankholding space, and both are sufficiently free of wrinkles to be accepted as typical pressings. Adjusting the blankholder still closer to the die resulted in pressure sufficient to trap movement and cause fracture, as indicated by shell F.

shapes, the point of punch contact is in the center of the blank, and there is a large area of metal which is free to move in any direction. The greater the distance from the point of punch contact in relation to the width of the metal between the blankholding faces, the greater will be the tendency to pucker, and the greater must the blankholding pressure be to prevent the formation of puckers.

The amount of pressure necessary to prevent wrinkle formation is largely a matter of trial and error on each particular setting of the tools. If pressure is insufficient, flow may be retarded by the stiffening of the flow area to the extent that the metal cannot move, when the punch will tear the bottom out of the shell. And if the pressure is too great, the metal in the flow area is trapped, also resulting in a fractured shell. In this connection, however, the "whys" and "hows" of the effect of blank holding pressures may be inferred from Fig. 37, which shows six shells which have been drawn under six different pressure settings, all as described in the caption.

Actually, adjustment of the blankholder for a circular shell is a comparatively simple matter although, for irregularly shaped shells, it is often necessary to use shims, placed at certain points behind the blankholder, in order to obtain correct control at all parts of the contour.

Draw Beads and Excess Flange Metal

With certain shapes, it is difficult to obtain sufficient pressure to prevent the formation of wrinkles by the use of flat-faced blankholding surfaces. The shells previously shown at D and E in Fig. 36, Installment No. 3, are typical examples. In such cases, flat-faced tools are not capable of gripping the metal with sufficient pressure to retard flow and prevent the pucker formation; therefore, draw beads—or other means—are used to augment blankholder pressure and to retard flow. A tool of this type is shown at A in Fig. 38 with an enlarged view of the bead shown at B.

This method is usually quite successful with high-strength stainless steels, which will not ordinarily fracture under the high tensile stresses applied to the stretching area. But if draw beads are necessary to draw a low-strength metal, the bead must not be too high because the metal will not stand up under the loads.

The design of the product may not always permit the use of a draw bead on this type of contour. In such cases, extra draws—or planishing or ironing operations—may be necessary to remove the puckers. With some metals, the addition of a little kerosene to the drawing lubricant will so weaken its film strength that a partial breakdown of the oil film occurs. This results in added friction between the blankholding faces, thereby retarding the movement of the metal

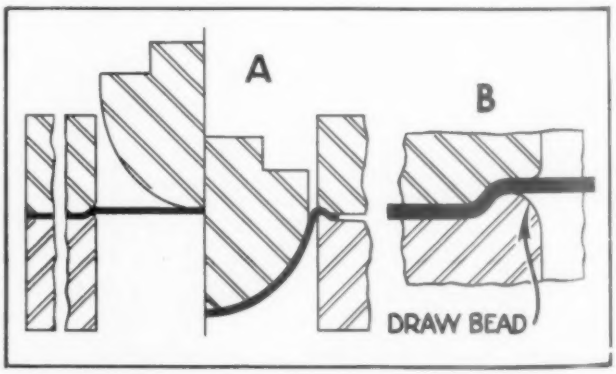


FIG. 38, a die with draw bead to augment pressure and retard flow. At A, the flange metal is trapped between a ridge on the die and a corresponding groove in the blankholder. When the blankholder comes down on the metal it forms the blank over the bead before the punch makes contact. The path through which the metal must flow is thereby made difficult and flow is consequently retarded. This necessitates a higher drawing pressure with higher tensile stresses, indicated in the center area, because of resistance to flow over the bead. This makes it possible to stretch the metal to the punch contour. An enlarged view of the bead is shown at B.

and helping to hold the metal tightly to the punch contour. This method, which is severe and can only be used for metals in the high-strength group, has been used for drawing austenitic stainless steel helmets. On the other hand, strong alloys of aluminum drawn on the same tools did not have sufficient strength for the drawing stresses involved when using such a weakened drawing lubricant. Too thick a coating of certain lubricants can also cause wrinkles in drawing operations. Because of the extra-high film strength of the lubricant, it will not spread, and therefore tends to hold the blankholding faces of the tools open, allowing wrinkles to form.

Wrinkling of rectangular and irregularly shaped blanks is often difficult to control, and this holds particularly for deep shells with small corner radii. Because of shape or other conditions, it is occasionally necessary to leave excess metal at certain parts of the flange so as to increase the area under blankholder pressure and thereby gain more control of the metal. Fig. 39 shows, at A, a rectangular shell with four different corner conditions of blank shape, any one of which may be necessary under certain conditions.

Types of Blankholding Equipment

When reduction percentages are discussed, it will be seen that greater initial reductions are usually possible on double-action than on single-action presses. This is due to the difference in the means of applying blankholding pressure in the two types of press equipment. On mechanical double-action presses, blankholder adjustment is obtained through the four screws at the corners of the blankholder slide. This provides reasonably fine adjustment which, when once set, remains constant throughout the drawing cycle and permits unwrinkled flow at any one or all of the four points.

On hydraulic drawing presses, adjustment is obtained by separate rams at each corner, and individual valves control the pressure at each point. On single-action presses, pressure is applied through compression springs, rubber bumpers or mechanical drawing attachments, which will be discussed in detail later in this series.

In the case of springs or rubber cushions, pressure rises as the draw proceeds because of the compression of the cushion, and after flow has begun, this increase of pressure tends to further retard metal movement and to make limit draws more difficult. On the other hand, use of pneumatic die cushions on single-action presses is an aid to more constant blankholding pressure and makes possible greater reductions than are obtainable with springs or rubber cushions.

Hydraulic drawing presses which portend an advance in press design, have features which cannot be readily incorporated in mechanical presses—as, for example, uniform drawing speeds throughout the working stroke; fast approach to the work; lower impact blow on the blank; means of recording blankholding pressures; and dwell at the end of the stroke. These features make possible greater reductions in one draw, more uniform thickness after drawing and, because of better flow control, greater total reductions between anneals.

The stresses on the metal in a drawing operation may result in an increase in thickness in some areas, and a decrease in other areas. The compressive stresses on the metal moving towards the die radius tend to cause the metal to build up in thickness, and the bending of the metal over the die radius tends to decrease the thickness through the bend. Both of these characteristics were previously mentioned in the discussion of flow.

Thickness Change

If the space between the punch and die walls is sufficient to allow free flow to the thickened material moving from the flow area, the walls of the shell will assume this increased thickness. And because of the thickness increase, there will be a decrease in surface area and a consequent loss of depth in the finished shell.

If, however, the die space is equal to the original thickness of the blank, the thickness added during the flow to the die radius will be reduced by ironing as the metal is drawn into the die. Should the amount ironed be considerable, severe ironing loads are added to the drawing loads with increasing tendency to fracture. As a general rule, the die space is made a little more than the blank thickness in order to reduce the ironing loads and yet give some control over the thickness increase.

The thickness increase is proportional to the flow and, since maximum flow takes place in the outer area of the blank, the greatest thickness increase will occur there also. This area on the blank supplies the metal for the upper sidewall of the shell, or, if it is a flanged shell, supplies the metal for the flange. In a typical draw, the thickness increase will vary from zero at the bottom of the side wall, where little or no flow occurs, to maximum at the top edge of the wall or on the flange where maximum flow occurs.

Areas of Thickness Increase

In order to explore the changes in thickness occurring as a result of drawing, three aluminum shells were selected at random from a production run and sectioned along lines relative to the direction of rolling. The thickness was measured on the bottom of the shells, through the corners, and at ½ inch intervals up the side walls. These sections, with their measurements, are shown in Fig. 40. Three sections were cut through shell No. 1; across the grain at A, or at right angles to the direction of rolling; with the grain—or

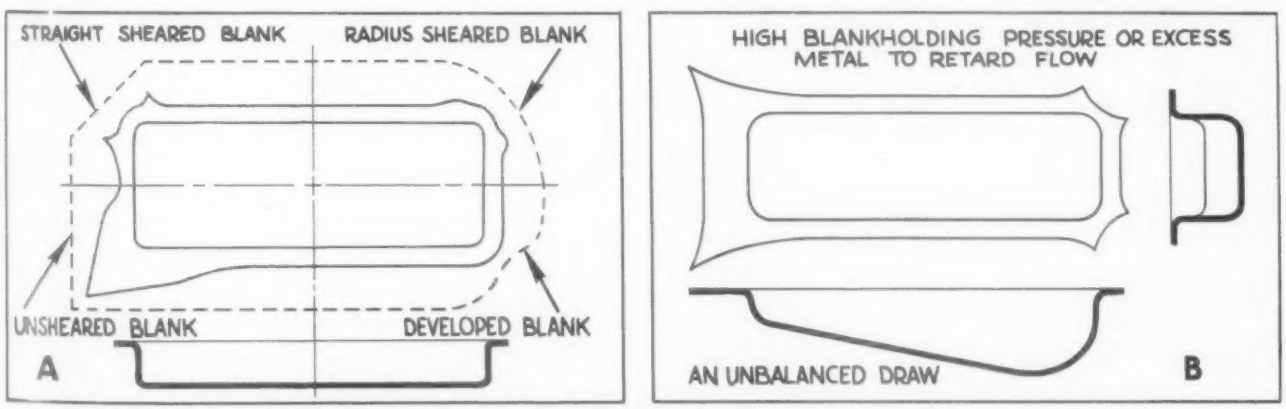


FIG. 39 shows, at A, the effect of blank shape on the corners of rectangular shells. The dotted line indicates original blank shapes, the solid outer lines the resultant shapes after drawing. The developed blank shape at lower right naturally results in a shell with more uniform flange shape after drawing. Sketch B is a typical example of where most of the metal movement is at one end of the shell. To prevent puckers, in cases of this kind, it is often necessary to use excess metal at the shallow end, where little movement occurs, in order to retard flow in that area while flow takes place at the deep end.

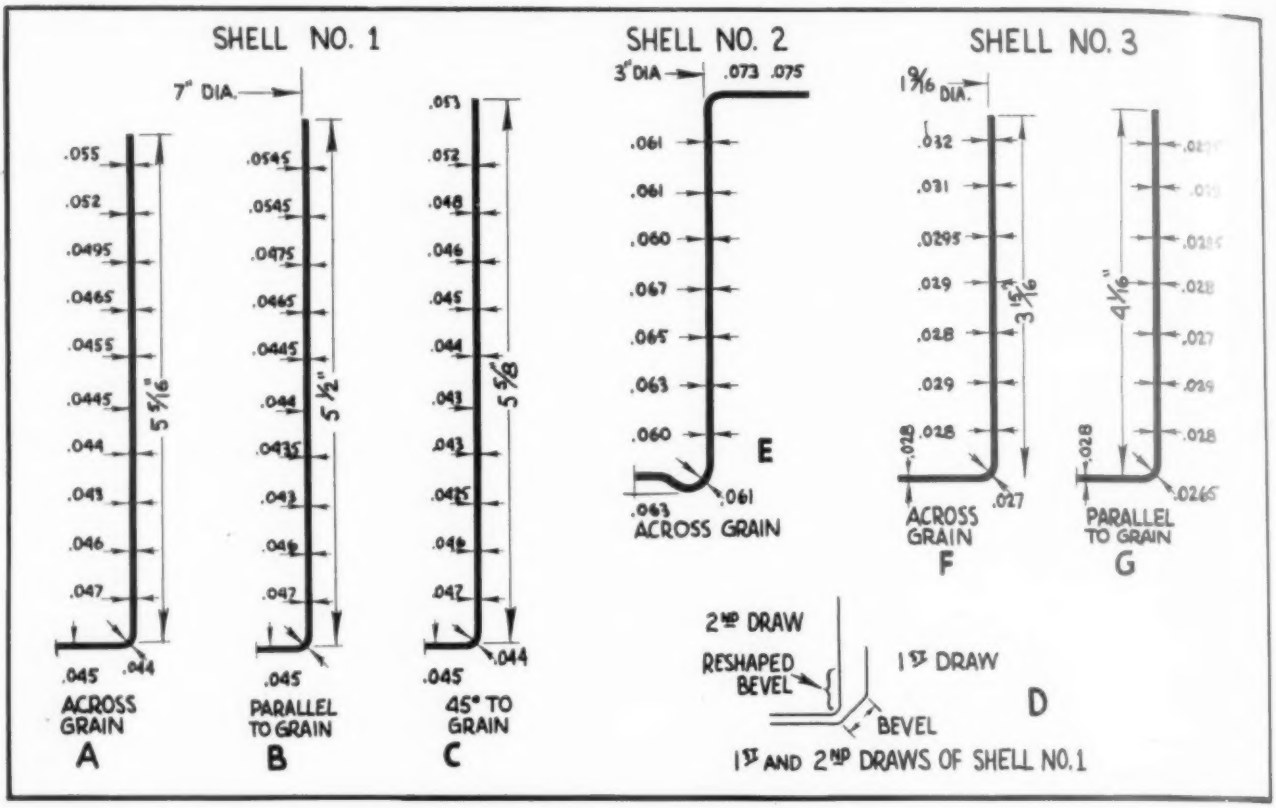


FIG. 40, showing changes in thickness that occurs as a result of drawing. In shell No. 1, the thickness increase seems more pronounced across the grain than with the grain or at 45° to the grain, and this has resulted in a greater loss in depth. The metal had slight directional tendencies at 45° to the grain, which resulted in an "ear" through section C. The thickness through this section is thinner than either sections A or B, because the metal has been drawn up into the ear. Sketch D, in reduced scale, shows thickening effect of an earlier operation. In shell No. 2, the outer edge of the upper flange has increased, during three drawing operations, from 0.064" to 0.075"—or about 17%. The punch and die sizes were such that the wall thickness increase was limited to a maximum of 0.065" and, because of a specific requirement on this particular product, the upper 1½" of depth was ironed to 0.061" in thickness. Shell No. 3 is the third operation on another part made from a 5⅛" diameter Alcan 2S-0 blank 0.028" in thickness, and shows the same characteristics as the other shells. The die space on the tools used for this shell allowed an increase of about 15% to take place, which is typical for bringing shells requiring several drawing operations to size.

parallel to the direction of rolling—as at B, and at 45° to the direction of rolling, as indicated at C.

All three sections were cut from the same shell, which was drawn from a 14⅜" diameter x 0.045" thick Alcan 3S-O blank. Shell No. 2—shown at E—was sectioned at an angle of 45° to the direction of rolling, and two sections were cut through shell No. 3. Section F was cut across the grain, and section G with the grain. The dimensions shown on all of the sections illustrated in Fig. 40 suggest three characteristics which are common to all sections, as follows: (1) Maximum thickness increase in the upperside wall metal; (2) minimum thickness increase in the lower wall and bottom metal; and (3) thickness reduction through the corner of the shells.

Areas of Thickness Decrease

It was stated, earlier, that minimum thickness increase occurred in the lower sidewall area. However, the lower two thickness dimensions in sections A, B, and C are greater than the thickness of the metal immediately above this area. This may be accounted for by the fact that, in an earlier operation, the metal in this area was free to increase in thickness. The reduced scale sketch, D, illustrates this point. The first operation shell was drawn with a bevel for redrawing purposes and, since most of the metal on the bevel did not come under the control of the first operation blankholder, it was free to increase in thickness. This left a narrow band of metal at the lower sidewall area which was slightly thicker than the adjacent metal.

As previously noted, most of the dimensional changes caused by flow occurs in the flow area, and if the thickness change occurring in this area is such that the metal is thicker than the die space, it will be ironed between the punch and die walls to a thickness equal to the intervening space. This is illustrated on shell No. 2, which was drawn from a 8⅛" diameter Alcan 3S-O blank, 0.064" in thickness.

This shell is a vacuum-cleaner motor housing, and the diameter at the open end had to be held to close limits in order to ensure a satisfactory fit of the motor field unit. Where the size was not critical, the same gradual increase in wall thickness may be noted.

To prevent excessive thinning at corners, the radii of the die and punch should not be less than four times the metal thickness. Thinning, occurring in earlier operations because of sharp radii, often appears on the sidewalls of later operations as a line or a depression increasingly higher on the wall as the diameter is reduced. If redraws are severe, these weakened areas may fail. Severe wall friction due to excessive ironing will also often cause a thinning of the metal at the lower corner of the shell.

In order to meet close inside and outside diameter tolerances on the full depth of a shell, it is sometimes necessary to reduce the wall thickness by ironing the shell from top to bottom, and if this ironing is too severe, the metal may be overstressed. In the manufacture of brass shell cases, the purpose of the operation is reduction of the wall thickness, and while thickness reductions of 40 to 50 per cent are common in this class of work, very little diameter reduction is taking place at the same time. In free drawing operations, the purpose of the operation is diameter reduction, together with only sufficient ironing to correct the natural increase in thickness due to flow. Severe wall thickness and diameter reductions should not be attempted in the same operations.

Installment No. 5 will follow in October issue.

By Chester S. Ricker

Precision Casting—A Production Achievement!

Intricate castings, held to Die-making Precision, require no machining as a result of advanced Foundry Methods

NEW PRODUCTS BEGET new processes. Buick's new "Dynaflow" torque converter drive incorporates a principle employed in the M-18 "Hell-Cat" tank destroyer transmissions during the war. Tailored to fit the torque and power characteristics of the Buick engine, it presented a difficult production problem as well as a direct challenge to Tool Engineers.

An engineering graduate of Cornell University, *Chester S. Ricker* turned to writing as a vocation after several years engineering and manufacturing practise, and is Detroit Editor of American Machinist. He is a senior member of the SAE and the ASTE and, by way of avocation, manages the Gold Cup Regattas, at Detroit, and is also official timer and scorer at the 500-mile races at Indianapolis.

Each of the five "torque converter" rotors—really a series of small turbine wheels—has a multiplicity of curved vanes on the periphery of a rotating disc. While these have been a toolroom product in the turbine industry where quantities are comparatively limited, experience of auto production tool engineers indicated die stamping the vanes and other elements, and then assembling and welding or brazing the parts together. It is done now with "fluid couplings," and may yet be done on a mass scale when production demand becomes high enough. For the present, however, precision aluminum castings that serve the purpose are being produced in sufficient quantities.

Antioch Process Used

Precision aluminum castings, now made in plaster molds by the Antioch process, are so accurate that only the edges and hub have to be machined. After wet blasting the passages between the turbine vanes to remove plaster, the surfaces are so smooth that no further finish is necessary. Much of the assembly time is in the careful setting of cores, although this is very rapid because of the precision with which plaster cores are made.

This process must not be confused with the "lost wax" method of making small investment castings in plaster. It is entirely different, inasmuch as the plaster cores used are assembled just like dry sand ones. The method of making the plaster cores, the constituents of the plaster mix, and the proper curing of the assembled molds is the heart of the Antioch method.

Modifications Possible

Flexibility in design is a very important thing when a new product is introduced. Nothing teaches like experience, and "freezing" design in a new development is what the production man wants and the designer dreads. Product success in a new field may require rapid modifications of the original design, therefore, inability to make changes quickly may be a serious handicap. Everyone who had to build airplanes or their parts, during the war, knows how important this "mod" practice was to the success of our fighters.

The "Dynaflow" torque converter elements are the heart of the drive. They work fine now, but engineers may discover better forms for the vanes and, if they do, it is a comparatively simple thing to modify a small core box instead of a miscellany of steel dies, fixtures, and assembly processes. This flexibility is perhaps one of the primary reasons for adopting the cast process rather than stamped steel fabrication. Also, it is claimed that tooling costs for castings were about a tenth as much as for an equivalent fabricated steel job.

Not a Conventional Foundry

The Allison-Bedford Foundry, where "Dynaflow" castings are made, is located in Bedford, Indiana, and operated by the Allison Division of General Motors Corporation which, incidentally, cast the cylinders and heads for the Allison aircraft engines. They learned how to make aluminum castings accurately and without porosity, cutting down scrap losses from over 30 per cent to less than one per cent by proper handling of both metal and molding. Naturally, this proved to be the logical place in which to make the torque converter castings.

Tool Making Precision

Plaster mold castings closely approach the smoothness of aluminum die castings and may be even closer dimensionally, especially in the large size units. On 11.5 inch diameter units the variation is held under 0.020 inch, and is proportionately closer in smaller units. Flash is also reduced to a minimum by properly setting cores—less, even, than on die castings.

Precision is evident in the vanes, which are held to a spacing of +/—2°, and the vane angles to +/—1° in angle. These vanes have a 1/64 inch radius edge which is held in the casting, but the vanes vary in thickness from 1/32 inch at the tip to 0.075 or 0.090 inch at the center in different units.

Control of both pattern making and foundry practice are comparable to practise in a fine die shop. Setting the cores in the mold for the thirty odd passages requires unusual accuracy both in individual cores and in spacing. These cores

Fig. 1. Unretouched photographs of five different Buick "Dynaflow" units made from plaster-cast aluminum alloy. The castings have been cleaned, with vanes and interior only touched by the vapor blast. Only the hubs and flanges have to be machined. The largest casting, which is the pump, runs at engine speed, and the one immediately underneath is the secondary pump casting. The larger rotor, at the left, is the turbine or driven unit that is connected with the rear wheels of the car, while the other two units are reactors or diffusers that properly and most efficiently direct oil flow from the turbine back to the pump.

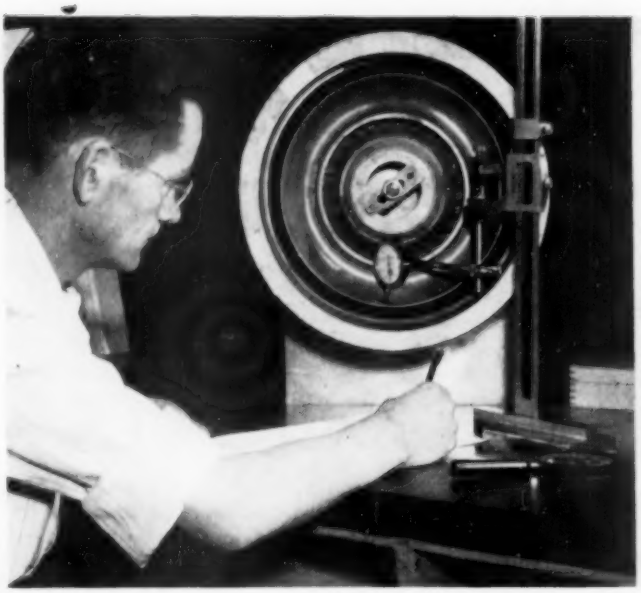


Fig. 2, left. Despite close dimensions, only a small percent of castings are rejected. Although engineering drawings permit +/— 0.010 inch variation of large dimensions, +/— 0.008 inch or better is usually obtained while concentricity is reported to be held within +/— 0.002 inch. Fig. 3, at right; the "slurry" mixer, carried on an overhead monorail, has a pantograph supporting arm and complete articulation so that the operator can fill molds on either the conveyor in front or the one behind him. Note the metal flask holding the plaster mold while it is being poured.

are not simple straight pieces, but horseshoe-shaped, with core prints at each end. These core prints must nest so accurately, around the circumference of the rotor, that the last one will slip in place without forcing and without a gap that would leave a fin. An extremely small tolerance only is allowed between adjacent core prints. When you multiply this by the number of cores required, a small accumulated deviation might make completion of the assembly impossible. That is why toolmaking precision is required, especially in making the core boxes.

Plastic Core Boxes Cancel Selection

In the June issue of THE TOOL ENGINEER, Robert W. Shaeffer told about making patterns from synthetic resins. Critical dimensions in the "Dynaflow" patterns and core boxes have to be held to 0.00025 inch, which is a real toolmaking job. All cores have to be alike. This problem has been solved by making a series of core boxes from a plastic. The plastic should not deviate from pattern dimensions and, in use, also must possess dimensional stability. Surface smoothness is another important factor which makes the plastic core box desirable.

Although it is slower to make plastic core boxes, it eliminates selection of cores when assembling molds on the production line. Before production starts, however, many core boxes have to be modified by cut-and-try methods. It is just as particular a job as putting a set of fender or body dies into service although when the plaster cores come out right, there is no further trouble with fits. Minute variations, while small in themselves, might cause a lot of trouble if errors happen to accumulate instead of offsetting one another.

Foundry Process

A few notes on foundry process should be interesting because they are so unusual. The making and assembly of molds is continuous. Loop conveyors carry the molds around. At one end, the molds are filled with plaster mix, then, after removing the solidified plaster core, cleaning the plastic mold, brushing or spraying mold with a release oil, they are closed and ready to start pouring again. Finished plaster molds or cores are then put on conveyor belts and delivered to the assemblers.

Special Plaster Mix

A specially prepared mix is used. The dry ingredients include gypsum, sand, an inhibitor which prevents any chemical reaction between aluminum casting and gypsum, and an accelerator which controls the rate of solidification. All elements are carefully weighed and mixed dry before water is added. Water is not added until the batch has been

Fig. 4. at top. Green plaster molds are placed in racks and conveyed by power forktrucks into the autoclave. Here, the plaster molds are first cured in steam under 17 psi pressure for about 8 hours. Fig. 5, at bottom shows inspection of the various torque converter units as they come from the vapor blast machine shown in the background. This is the only finish necessary on these castings and the intricate cored passages between the vanes.

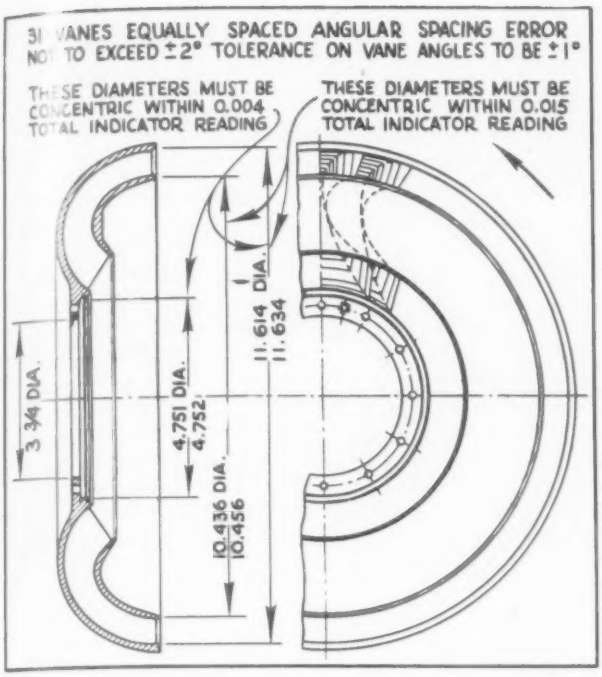


Fig. 6 Line drawing, showing the shape and general dimensions of the turbine unit of the Buick "Dynaflow" drive.

dry mixed and dumped into the wet mixer. Then a metered quantity of water is added until the entire contents are a uniform creamy mixture called a "slurry." Reaction time is very important and limits the amount of "slurry" mixed at a time. When the wet mixer is not in use for periods longer than ten minutes, any unused residue is flushed out of the mixer and the distributing hose before a new slurry is prepared. This procedure helps to control the uniformity of the plaster molds.

Two Days to Cure Plaster Molds

Curing the plaster molds is not a simple job like that for dry sand. The molds have to be very carefully heated and cooled at varying temperatures before they can be poured. It takes 48 hours to complete this preparatory work. After the plaster molds are completed, they are further processed to prevent too rapid drying, and then remain at room temperature for six to eight hours to initially harden.

Following initial drying, they are shifted into an autoclave, where they are cooked for eight hours in a steam atmosphere at 17 pounds psi. Cooling off molds for 12 hours at room temperature follows the steam cooking. Finally, the molds are put in oven dryers and baked at 400°F for 20 hours. Then they are ready to be poured.

Use Steam to Chill Metal

This long preparatory cycle on each mold is the best way, so far discovered, to remove all free moisture, but not to eliminate all the water of crystallization. It takes two molecules of water of crystallization to make the slurry—an anhydride containing two molecules of water to one of gypsum.

When the mold is cured and ready to pour, it is a hemihydrate (½ molecule of water of crystallization in the gypsum). This makes the plaster more permeable so gas or steam can escape when the mold is poured. Casting blows are thus prevented. The remaining water molecule turns to steam when the hot metal hits the plaster surfaces, and the latent heat of the steam chills the metal and hastens solidification.

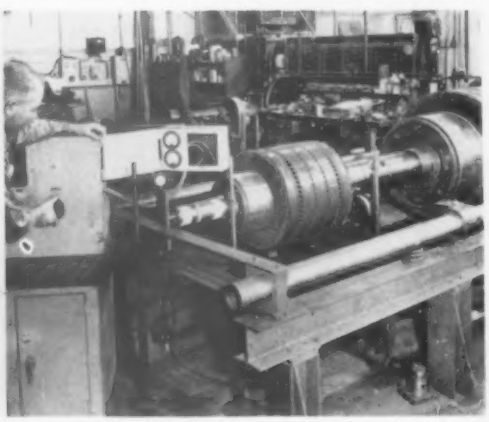
This is very important because gypsum is an ideal insulator and hot metal would not cool off quickly enough if it were encased in pure gypsum alone. Utilizing the water of crystallization, too, serves both as a means of getting porosity and chilling the casting. Methods like this are evidence of the scientific laboratory and engineering studies which have been made in perfecting this process of making precision molds.

A New Tool for Designers

Where the product is to be made into small quantities or subject to development changes or is of such an intricate shape that it is impracticable to make on conventional tools, this process offers designers a whole new field of opportunities. This plaster casting process requires the closest tool shop precision in making patterns and also production tools to finish the castings.

Servicing of Motor-Generators a Precision Job for San Francisco Branch of General Electric





That the servicing, repair and reconditioning of armatures for large motors, generators and exciters can well be a precision job requiring precision equipment is evidenced by the several photographs taken at the San Francisco Service Shop of General Electric Company. The photo at left shows how armature bars and commutator risers are wedged with wood prior to joining the two with solder. Center photo shows turning and grinding of commutators for generator and exciter in a 60-inch Niles Lathe. The rotors are covered as protection against turning and grinding chips. In photo at right, combined generator and exciter armatures are set up for dynamic balancing.

By F. J. McArthur

Milling–Drilling Attachment Saves Handling

Auxiliary equipment on Turret Lathe speeds output and conserves floor space

HOW MACHINING operations on large and awkward-to-handle parts can be simplified, with saving in floor space, release of expensive equipment for other work and consequent marked savings in manufacturing costs, is well illustrated by a milling-drilling fixture designed for supplementary machining operations on center and back bars for Fay automatic lathes.

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These bars which, to meet various adaptions and specifications, range from 3 to 4 inches in diameter and up to 19 ft. 9" in length, are first turned, faced and threaded on a turret lathe. It is then necessary to mill keyways and to drill a hole, 0.310 in. x 5/8 in. deep, as indicated in Fig. 1. All machining operations are held to close limits of tolerance.

Previously, the keyways were cut on a horizontal miller and, because of the length of the bars, considerable clearance had to be provided around the machine. Even then, the bars protruded into the aisles, the same holding true for drilling the hole. Besides, the weight of the bars entailed crane-lifting and trucking to move from one department to another for the several machining operations, and even for small-run production—25 to 30 pieces per lot—this extra handling ran into a considerable figure.

Drill and Mill in One Set-up

In order to reduce handling, as well as tie-up of space and equipment, it was decided to mill the keyways and to drill and ream the hole while the bars were still in the turret lathe. Consequently, a combination milling and drilling fixture, for direct mounting on the cross-slide of the lathe, was designed and built. This fixture, which is shown in the photographs, Figs. 1 and 2, consisted of adapting an electric drill to a slide, operated by rack and lever, for positioning in close relation to the turned surfaces. The drill and reamer were chucked, respectively, in interchangeable collets.

Also incorporated was a Model M Master Lathe Converter milling attachment. The latter has a special spindle support, at the base of the fixture, which serves as an "over-arm" for the cutter arbor. This support is held in alignment with the spindle by means of a tongue and slot, and may be quickly detached for change of cutters. By setting stops for the carriage, the position of the keyways may be duplicated for the duration of a production run.

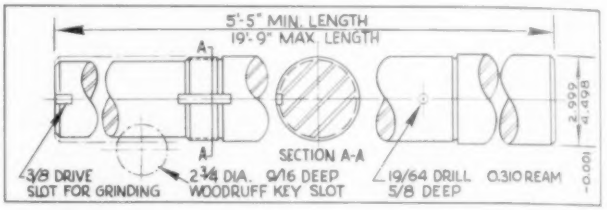
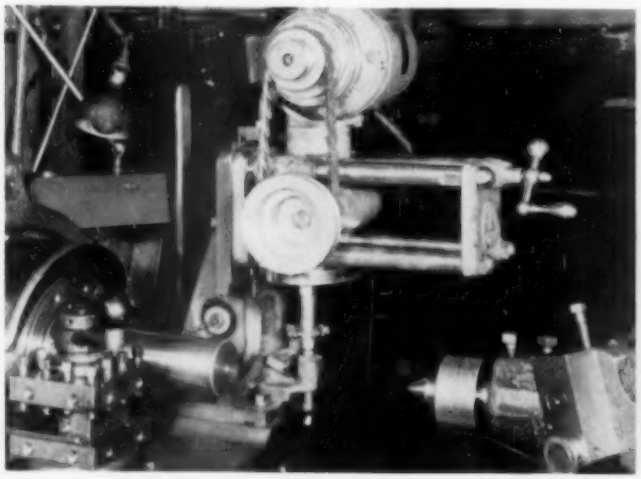
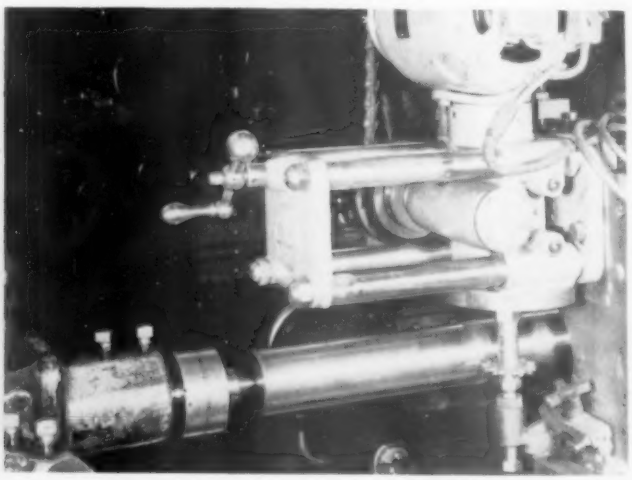


Fig. 1. A typical center and back bar shaft for Fay automatics. In addition to the drilling and reaming the 0.310 in. hole, keyways and a driving slot, the latter for subsequent grinding, are cut as shown.

By use of this fixture, turning, keyway milling and drilling is done in the one setup with elimination of all but two handlings for the entire sequence of machining operations—that is, the parts now move directly from the turret lathe to a grinder, for finishing to size.

Not only has there been effected a saving in handling, trucking and storage; but, where it required 7.75 minutes per piece to set up and mill the keyways by the previous method, this is now done at an average time of 2.79 minutes per piece. This is in addition to time saved in setting up the part for drilling.





Figs. 2 and 3, left to right, show the milling-drilling fixture mounted on the cross-slide of a turret lathe. Fig. 2 shows the drill, chucked in a spring collet, and Fig. 3 a keyway being cut at the location of the thread. In-feed is by means of the cross-slide feed-screw, while longitudinal traverse is effected by the ball crank shown at the outer end of the fixture. A detachable bracket, clamped to the base of the fixture, serves as an over-arm for the cutter arbor.

By E. K. Morgan

34-11000

The "How" of Machining Large Work

Standard Equipment With Standard Attachments, Provide Facilities for Machining Unwieldy Work

FIRST ANALYSIS in handling large, or cumbersome odd-shaped work in general often indicates that a particular machine tool lacks adequate capacity to perform the operations required. As a result, what may be termed unusual machining jobs commonly assume undue proportions when considered in relation to the machine on which the part is to be completed.

In many instances, out-of-the-ordinary work is machined as a single unit or piece which not only complicates the production problem further, but also makes it unwarranted to have special purpose machines for the job. Yet, to meet engineering design requirements, large shafts, housings, rods, supporting structures, weldments and similar equipment components must be machined to close limits for proper assembly. In this respect, it is safe to state that, at one time or another, every progressive production man in the country has been confronted with the problem of how to machine such work.

Examination of several different jobs shows the ingenuity of these men in overcoming a number of difficult machining problems. Then, too, analysis indicates the important place of the horizontal boring machine in performing a broad variety of hard-to-handle operations.

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Open construction of this machine permits unhampered extension of work in three directions—lateral, longitudinal and vertical—and actual machining capacity is determined only by the floor area adjacent to the machine. Limitations rest in being able to position work and present it to the spindle for different operations.

Rollers Provide Free Movement

A large drag line drive shaft for earthmoving equipment, whose length may be as much as 45 feet and weighing twenty tons, is shown in Fig. 1. On the squared ends of this shaft are mounted eccentric cams which propel the earth-moving unit. Near the shaft's center, and on a similar square, is mounted the drive gear. The mounting surfaces are approximately 19″ square on the largest shaft, and are milled to a tolerance of 0.0005″ with parallelism of the flats held to 0.010″.

To handle this long and heavy piece, the shaft is mounted at right angles to the machine spindle, overhanging the table, and with extended section resting upon a set of lateral rolls, shown in the inset. During the milling operation, one end of the shaft is bolted to the machine table while the heavier or extended sections moves freely on the support.

This setup arrangement permits unlimited lateral extension of the work with easy table traverse, which simplifies

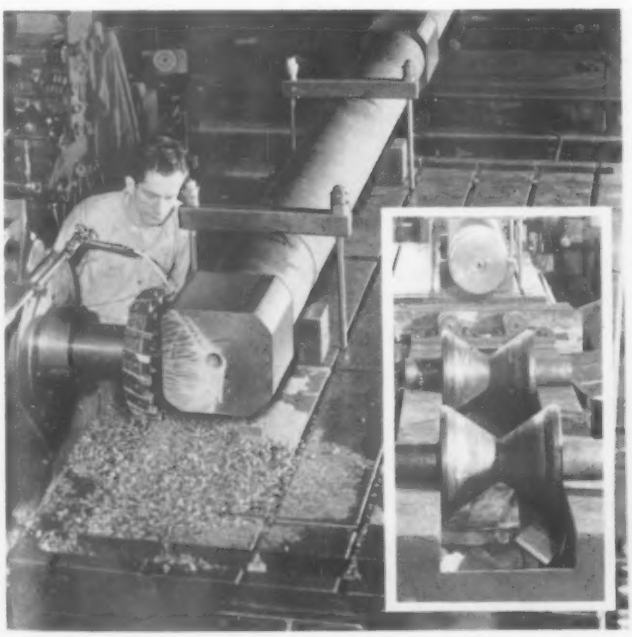


FIG. 1. Square-milling a large-diameter drag line shaft on a horizontal boring mill. Lateral work extension, at right angles to the machine spindle, is limited to the amount of floor space available. Overhanging end-weight of the shaft is carried on Vee rollers, shown in inset, to prevent deflection.

FIG. 2. Drilling end flange of a 10-ton ship line shaft. A templet jig clamped to the flange, spaces the drilling, a slip bushing being moved from hole to hole until all are drilled. The holes are subsequently rebored, in the same setup, to large diameter. Overhang is supported as shown in Fig. 1.

handling, while the Vee-type rolls tend to center the shaft, keeping it in alignment when the squares are machined. In practice, this does not affect the machine's functions inasmuch as feeds can be freely engaged. Only one end of the shaft is clamped and the remainder of the shaft floats on the Vee-rolls.

An inserted tooth high-speed-steel cutter is shown milling the first surface of the cam square, after which, the shaft is unclamped and rotated in correct position for machining the second flat surface and so on until the first square is completed. A 2-9/32" hole 2¼" deep is drilled in one surface before the setup is changed. The workpiece is then moved by crane into position for the second or gear square, where like operations are performed.

Machine scales and verniers are used to locate the work and to determine stock removal and, when both squares have been milled, a precision level is used to check parallelism of the finished surfaces. After completing the second square, the shaft is turned end for end and the second cam square is machined. The same machining pattern is followed.

Naturally, magnitude of this type work is lessened after the method is once established. Overall machining time for all squares on the horizontal boring machine is considerably less than would be required for planing. Furthermore, the length of the workpiece necessitates that the planer bed would have to be at least 36 feet long.

The problem of machining the ends of unusually long work is solved by extending the part longitudinally or parallel to the machine spindle, overhanging the machine table and bed. To accomplish this, the end support column is removed. It is then possible to mount any length workpiece on the table, provided that an auxiliary outer support is used —as, for example, the manner of mounting a 10-ton ship line shaft, shown in Fig. 2.

Horizontal Setup Facilitates Machining

Properly aligned V-blocks and bar type clamps hold the work rigidly to the table. The outer end of the shaft rests on a simple auxiliary roller type support, similar to that used for the operation described above, which permits free saddle movement. Mounting the part in this manner enables the operator to use both saddle and headstock feed, thereby simplifying the machining operations.

A plate jig, clamped to the outer flange surface of the shaft, holds a slip drill bushing for one of ten 2⅞" dia. coupling bolt holes. After all holes are drilled, the [illegible]plate is removed and the holes opened to 3⅞" diameter with a single point boring tool. Next follows a back spot facing operation on the reverse side of the flange. The holes are then taper reamed before turning the shaft end for [illegible]d and performing the same operations on the opposite flange.

The method described assumes additional interest when it is realized the shaft body is 18" in diameter and 49" in length, and that the total time taken to complete all operations on both ends of the shaft, including two setups, is but 14 hours with all machining performed to precision limits.

The merits of handling cumbersome work in this way can be appreciated only by comparison with alternate methods for doing like operations on a similar part. Owing to the length of the shaft described, and its weight, it becomes readily apparent that the horizontal positioning not only provides comparative ease of setup but a comparable ease of machining.

Both Ends At One Setting

By extending work in the vertical plane, it is possible to bore and thread a large connection rod, such as shown in Fig. 3. There are no interfering machine components to complicate the comparatively simple setup used to handle this forging, which is more than 10 feet long. The rod is clamped to a standard angle plate, as shown, and receives additional support from an overhead chain fall. The work mounting method provides ample support to complete the precision operations required, as rough, semi-finish and finish boring to 12" diameter, counterboring, and chasing a 10 pitch V-thread approximately 2" long.

A continuous feed facing head, equipped with a telescopic type tool holder, enables the operator to bore, counterbore and thread. Machine table feed is used for boring, counterboring and chasing the threads. In this connection, the connecting rod is mounted against a spacer ring, which makes it possible to perform threading operations on both sides of the bore without changing the original setup. Incidentally, the work shown is being done on the smallest sized modern horizontal boring machine having only a 2½" diameter spindle.

The importance of completing as many operations as possible on a workpiece in a single setup needs no emphasis. In addition to time saved by eliminating repetitive work setups for boring, milling, drilling, reaming, tapping and like operations, overall accuracy of the completed part is vastly

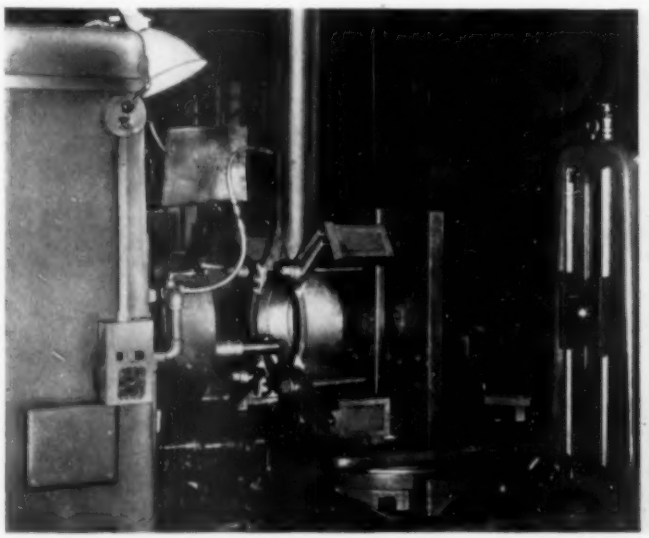


FIG. 3. Boring, counterboring and threading is accomplished on both ends of a large connecting rod by mounting the workpiece on a backing plate, permitting machining of both ends on the one setting. In addition to the clamping, weight is further taken up by means of a suspended chain falls.

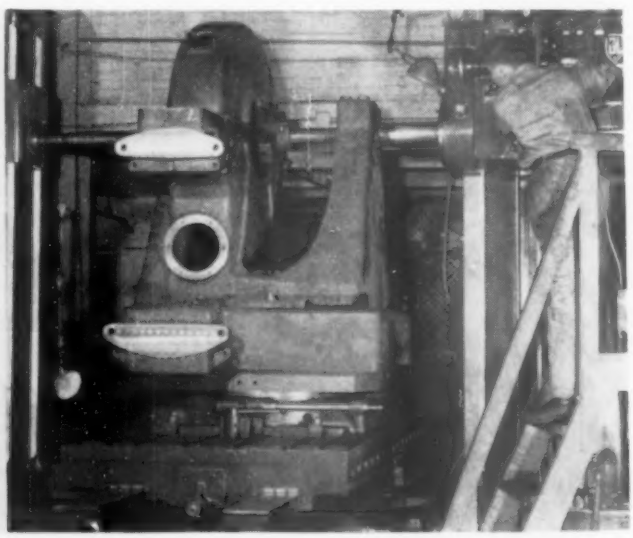


FIG. 4. Machining of an awkward elevator gear housing is facilitated by mounting on a power driven rotary table. Eleven operations are performed on this workpiece at one setup.

improved. Take, for example, the machining methods employed to complete a cumbersome and rather complex elevator gear housing, as shown set up in Fig. 4.

Here a standard horizontal boring machine equipped with a standard rotary table simplifies the diverse machining operations required. By combining both machine and rotary table movements, a series of precision operations are readily performed on the four sides of the casting at various positions and at different spindle heights.

An analysis of the feed movements of the horizontal boring machine, as well as simplicity of indexing the work, offers solution to the "how problem" on this odd shaped casting. For example, it is possible to move the machine table and saddle longitudinally, or parallel to the machine spindle; or, the table may be moved laterally at right angles to the spindle. The machine headstock may be raised or lowered, thus providing vertical spindle travel, a combination of feed motions that permit a broad pattern over an unusually wide work area.

Complete Machining in One Step

Then too, by mounting the gear housing on a rotary table, it can be indexed to any point of a circle. Through this arrangement it is then possible to complete cutting operations with the work in almost any position and at almost any angle, machines scales and verniers being used for rapidly locating all dimensions.

A quick summary of the operations performed on this elevator gear housing indicates the simple sequence followed to bore, mill, drill, face and tap. Operation sequences are as follows:

1. Align casting; bore 8″ and 9½″ in casting front. Index 90°.
2. Drill and tap seven ½″ holes and one ¾″ pipe tap.
3. Mill motor end face and inside bore face.
4. Index 90° mill rear face of worm bore.
5. Insert boring bar and rough, semi-finish and finish bore worm gear bore. Here bores are made simultaneously with the block type cutters used preset to desired diameters.
6. Drill and tap six ⅝″ holes also one 1½″ hole.
7. Index 180°; drill and tap six ⅝″ holes; drill and ream four 1-1/16″ holes for motor; drill and ream ¾″ brake arm holes.
8. Index 90°; place cover on housing and bearing caps in place; insert boring bar with support cutter block and bore 18″ diameter. Note: This tooling is shown in the photograph, Fig. 5.
9. Bore 6″ bearing.
10. Bore 6¾″ bearing.
11. Drill and tap miscellaneous ½″ holes.

In view of the many operations involved, and that standard equipment and tools were used throughout, it may be of interest that setup time was 2½ hours, and machining time, 30 hours. Tolerances: Milled surfaces, plus or minus 0.005″; bores plus or minus 0.002″. Cutting tools: H. S. S.

Standard Machines Are Versatile

The preceding information and illustrations show, in part, a few of the many methods created to solve difficult machining problems using standard table type horizontal boring machines. Examples have been selected to show how work is simplified when bulky parts are extended in any plant, especially where there are no integral machine structures to hinder work mounting. Of particular interest, however, is the use of a standard machine to finish turn a bearing on the bottom of a large weldment, approximately 16 feet square and almost as high. This fabricated part, and the setup used are illustrated in Figs. 5 and 6.

In this case, only a single unit was required and existing shop machines did not have the necessary capacity to mount this work for the operation. Even if it were possible to place this steel component on one of the few vertical boring mills available having capacity to handle a housing this size under the rail, a secondary problem of plate flexure might be created. Cutting tool pressure and failure of the fabricated walls to rigidly support the base plate might result in dishing the surface. And subsequent assembly required that this part rotate freely as well as accurately on the bearing being machined.

The method of machining the bearing as shown was quite simple, once a practical way to turn the bearing and to produce a precision finish without distorting the base plate of the weldment had been arrived at. In short, the shop men had to figure out the "how" of doing the job.

A standard rotary table regularly used on a floor type horizontal boring machine solved the problem. Instead of using this auxiliary unit as an attachment for indexing and holding work, it was used as a machine itself to drive the cutting tool. Ample power with variable table feeds makes it possbile to adapt the rotary table for occasional work of this kind. Fig. 6 shows the cutting tool in position, feed being toward the outside diameter of the bearing.

To reduce this job to simple elements, a tool slide was removed from a planer and mounted on the rotary table. The weldment itself was placed on four discarded castings, as shown in "A"-"A," bolted to the floor plate of the machine, and firmly clamped, and the rotary table is centered immediately under the bearing. The machine operator rides the table and, after each revolution, feeds the cutter through the hand screw of the tool slide.

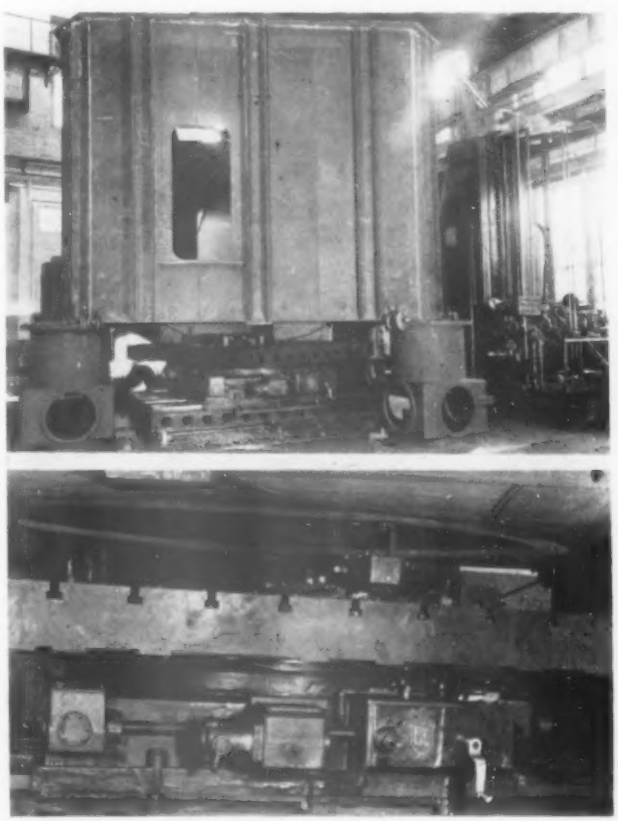


FIG. 5. Machining the bottom bearing of a weldment approximately 16 ft. square and 13 ft. high. The part is mounted on blocks (discarded castings being used here) and the whole clamped to a large floor plate. A planer head is mounted on rotary table centered with the bearing ring and the bearing is faced by feeding from inside-out. FIG. 6, below, shows the cutting tool in action.

Cutting and Horsepower Formula and Chart

This Chart, with its formula and instructions for use, is published as a result of numerous requests, by readers of The Tool Engineer, for terse yet specific information relative to horsepower requirements for cutting operations on various materials such as steel, ferrous and non-ferrous metals, fibre and plastics. It is presented on opposite pages so that it may be cut out and mounted for ready reference.

THE EDITORS

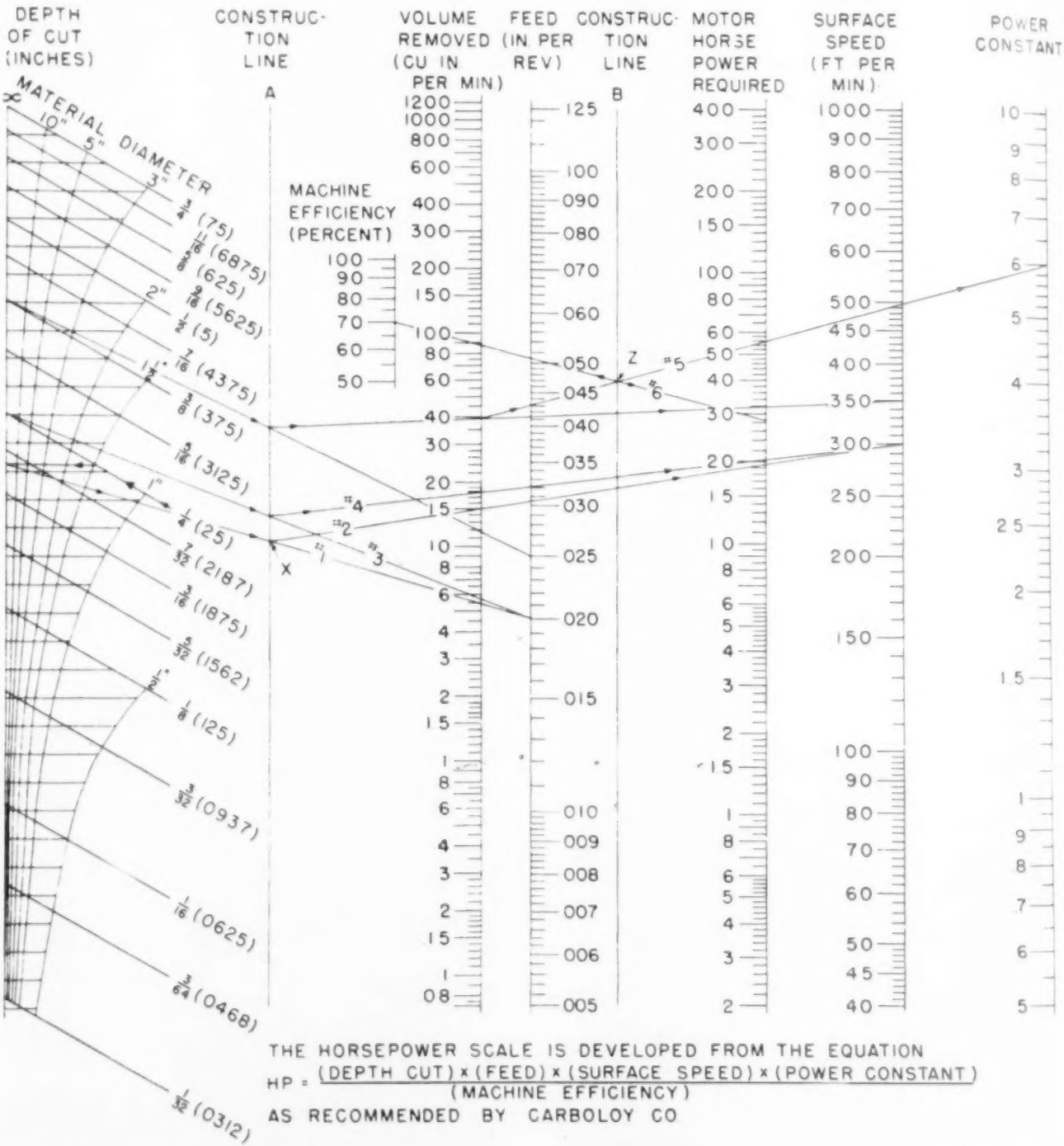


Chart for determining Cubic Inches of Material Removed per minute in relation to Surface Speed, Depth Cut, Feed, and Material Diameter;—also Horsepower Constant. This Chart has been prepared by the Engineering General Division, Apparatus Dep't, General Electric Company, and is based on recommendations by Carboloy Company, Inc. See opposite page for instructions and power constants.

Table of Power Constants as Recommended for Average Work

STEEL CUTTING

MATERIAL TO BE CUT		POWER CONSTANT
CARBON	SAE 1010-1025	6
	SAE 1030-1095	8
FREE CUTTING	SAE 1112-1120	6
	SAE X1314-X1340	6
Mn	SAE T1330-T1350	9
NICKEL-	SAE 2015-2320	7
	SAE 2330-2515	9
NICKEL-CHROME	SAE 3115-3140	8
	SAE 3145-3440	9
Mo	SAE 4130-4820	9
Cr	SAE 5120-52100	10
Cr V	SAE 6115-6195	10
	SAE CAST STEEL	9

FERROUS CASTINGS

MATERIAL TO BE CUT		POWER CONSTANT
CAST IRON	HARD (NO ALLOY)	4
	MEDIUM (NO ALLOY)	3
	SOFT (NO ALLOY)	3
	HARD (ALLOY)	4
	MEDIUM (ALLOY)	3
	SOFT (ALLOY)	3
	UP TO 25% SEMI-STEEL	3
	OVER 25% SEMI-STEEL	3
	BRAKE DRUMS HEAT TREATED	4
	BRAKE DRUMS CENTRIFUGAL	4
	CHILLED ROLLS	5
MALLEABLE IRON	HARD	5
	MEDIUM	4
	SOFT	3

NON-FERROUS

MATERIAL TO BE CUT		POWER CONSTANT
BRASS AND BRONZE	HARD	10
	SOFT	4
ALUMINUM	CASTINGS	3
	BAR STOCK	4
ZINC ALLOY	DIE CASTINGS	3
RUBBER	HARD	
	SOFT	
COPPER		4
COMMUTATOR		4
FIBRE		
PLASTICS		

This table is based on recommendations by Carboloy Company, Inc., Detroit, Michigan, an affiliate of General Electric Company.

INSTRUCTIONS

TO FIND VOLUME OF MATERIAL REMOVED

A - FOR LATHES AND BORING MILLS: (NOTE: ON LATHES THE STOCK DIAMETER IS MEASURED BEFORE THE CUT, ON BORING MACHINES IT IS MEASURED AFTER THE CUT.)

1 - START ON SLANTING LINE INDICATING DEPTH OF CUT.

2 - GO UP THIS LINE TO PROPER STOCK DIAMETER.

3 - FROM THIS POINT GO LEFT HORIZONTALLY TO VERTICAL LINE MARKED oo.

4 - CONNECT THIS POINT TO FEED PER REV. (LINE 1 IN EXAMPLE). MARK THE POINT WHERE THE LINE CROSSES CONSTRUCTION LINE A. (X IN EXAMPLE).

5 - CONNECT X TO SURFACE SPEED (LINE 2). READ CUBIC INCHES REMOVED PER MIN. WHERE LINE CROSSES VOLUME SCALE.

B - FOR PLANERS:

1 - START AT INTERSECTION OF SLANTING DEPTH OF CUT LINE AND VERTICAL LINE MARKED oo.

2 - PROCEED FROM THIS POINT AS OUTLINED IN STEPS 4 AND 5 ABOVE FOR LATHES. (LINES 3 AND 4 IN EXAMPLE.)

TO FIND HORSEPOWER

FOR LATHES AND BORING MILLS:

1 - START AT INTERSECTION OF SLANTING DEPTH OF CUT LINE AND VERTICAL LINE MARKED oo.

2 - CONNECT THIS POINT TO FEED PER REV., MARKING THE POINT WHERE THE LINE CROSSES CONSTRUCTION LINE A.

3 - CONNECT THIS POINT TO THE SURFACE SPEED MARKING THE POINT WHERE THE LINE CROSSES THE VOLUME SCALE. (NOTE: THIS VALUE IS NOT NECESSARILY THE CORRECT VALUE FOR VOLUME REMOVED. SEE INSTRUCTION ABOVE FOR VOLUME OF MATERIAL REMOVED.)

4 - WHERE LINE CROSSES VOLUME SCALE CONNECT THIS POINT TO VALUE OF POWER CONSTANT OBTAINED FROM TABLE. MARK THE POINT WHERE THE LINE (5 IN EXAMPLE) CROSSES CONSTRUCTION LINE B.

5 - CONNECT THIS POINT (Z IN EXAMPLE) TO VALUE OF MACHINE EFFICIENCY AND EXTEND THE LINE TO THE RIGHT (6 IN EXAMPLE). READ MOTOR HORSEPOWER ON POWER SCALE.

IN GENERAL WE CAN ASSUME THAT 70% MACHINE EFFICIENCY WILL BE SATISFACTORY FOR AVERAGE CONDITIONS.

By Rex Heath 34-51000

Standardized Guns Cut Welding Costs

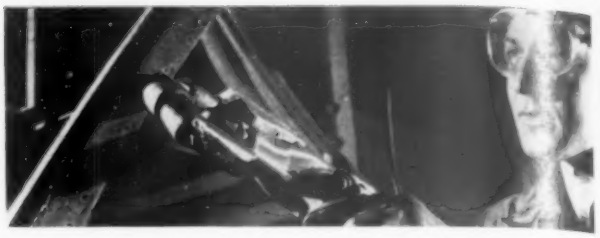


Fig. 1. Spot-welding tacking strip on '49 Mercury body at Lincoln-Mercury assembly plant, Los Angeles, with portable welding gun. Photo courtesy of Ford Motor Co.

ECONOMIES EFFECTED by bringing tools to the work have long since been recognized by industry; as a result, there is available a wide range of portable air, hydraulic and electric tools, some specially designed but the most standardized and built for interchangeability of parts. Yet, while portable welding guns—such as shown spot-welding a tacking strip on an automobile body, Fig. 1—have been available to the resistance welding field for some time, it is only recently that these tools have been standardized, with essential parts interchangeable, as a result of development by Progressive Welder Company, Detroit.

In method of application, these guns may be compared to hydraulic riveters, which may be had with standardized cylinders interchangeable with various types of frames—as, for example, C-frame, scissor and alligator types in the squeeze riveters; pull-type in expansion riveters; and push in pneumatic percussion tools. Thus, we have scissor, bell-crank, C-frame, deep-throat, clam, push and expansion types in the riveter guns, all as shown in Fig. 2. Like portable riveters, these tools may be suspended from spring balancers.

The Right Tool for the Job

With these various types and shapes, it is possible to get at spots in the majority of hard-to-get-at places. But not into all; consequently, special designs must be provided for unusual jobs. And that is where interchangeability comes in, since, with basic standardized components to start with, such as shown in Fig. 3, the tool engineer or production executive can have made up the exact tool needed for a particular job.

The number of practical variations that may be had from a single basic gun chassis is almost unlimited, the main variation being in the jaw extensions and, to a more limited extent, in the electrodes. In addition to the wider range of applications, there is the further advantage of reduced inventory of welding guns with a commensurate reduction in tool costs. In addition to the welding guns, other units such as boosters, air valves, and sub-assemblies have also been standardized, the whole comprising a complete welding installation.

The guns are designed to take interchangeable air or hydraulic cylinders to suit individual plant requirements, and since these units are also standardized one may pre-determine the required pressures to be expected from each installation. The hydraulic cylinders, which are equipped with non-slip grips and clamp-on switches, serve as handles for the guns while the air cylinders are provided with double-end handles which may be locked in any desired position.

When used with spring balancers, the guns may be suspended within easy reach of the operator and, since weight is counter-balanced, handling is practically effortless. With a further resort to overhead tracks and cross-trolleys, the guns may be traversed lengthwise with an assembly as well as across, the whole comprising a very flexible setup even for involved assemblies.

The applications shown in Fig. 4 cover simple as well as complex spot-welding, depending on the nature of the job and the accessibility of locations. For example, a C-type gun could be used advantageously for spot-welding an angle bracket to the channel, as suggested at A, and could even be reversed for welding the bottom bracket. Here, however, a clam or scissor-type frame were preferable. The same would hold for welding the plates to the channels, as shown at E, while for the welding shown at C, a gun with special jaws would be used. In all cases, however, the guns themselves are standard and interchangeable.

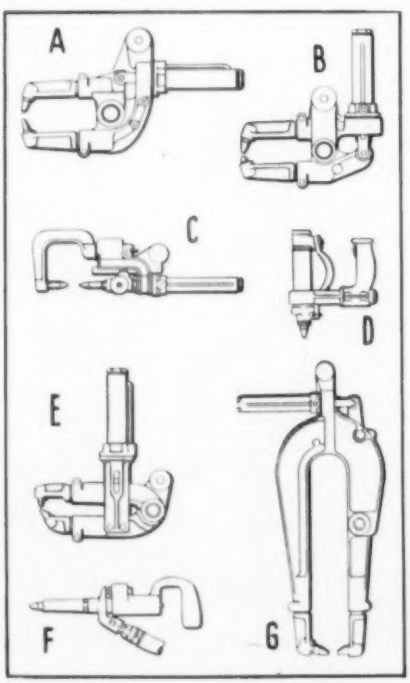
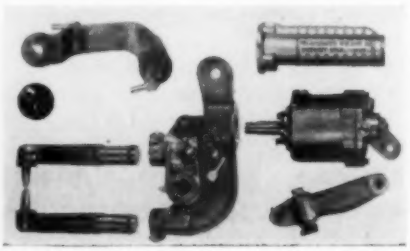
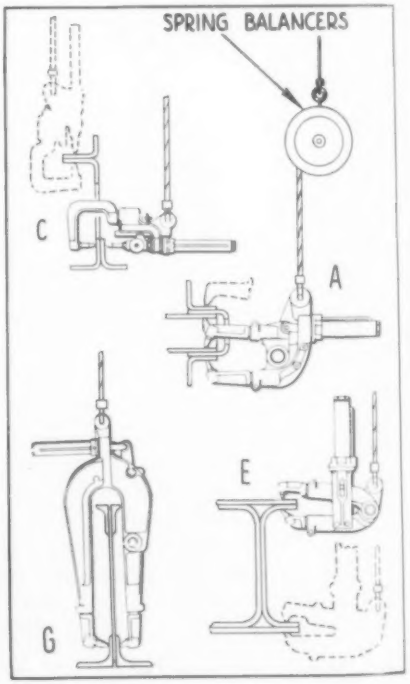


Fig. 2, at left, shows seven basic standardized welding guns; A, bell-crank action; B, scissors; C, C-type direct action; D, expansion gun; E, clam-action; F, push-type, and G, deep-throat rocker-arm type. Photo, Fig. 3 below, a typical welding gun disassembled to show standardized parts which may be interchanged with other standardized parts to vary gun design for different applications. Figs. 2 and 3 by courtesy of Progressive Welder Company, Detroit. Fig. 4, at right, suggests several applications of standard and special welding guns, the latter incorporating basic standardized parts. Letter symbols are the same as in Fig. 2. At C, a C-frame gun; at A, bell-crank action; at E, c am-action; and at G, deep-throat rocker-arm type. The guns are suspended from spring balancers.





By Robert W. Haynes

Tooling Up the Job

Knowledge of Tooling an Advantage in Salesmanship

While a knowledge of tooling and manufacture may not be an essential requisite of a machine tool salesman, such insight may yet be desirable when having to answer questions put by a hard-headed prospect. Before we can do anything, of course, we must define the job that is to be tooled. And the more thought directed to this matter, the more it appears to be a rather complicated problem.

For example, it is not enough to define a job as a "6-cylinder L-head engine", nor yet enough to fix production at 500 units per day. And the definition is far from complete when we set the length of the day at 16 hours. True, these are some of the facts we need but they are only the general bench-marks which will clearly outline the job and dictate the tooling.

"Tool" Is An Inclusive Term

Right here, let it be stated that the word "tool" means everything necessary to the business of producing and shipping a product. It includes buildings, boilers, conveyors, furnaces, benches, bins, floor sweepers and cranes as well as jigs, fixtures, gages and machinery. And a product is always tooled for one of two reasons: (a) There is no way of making it without tools, or (b) a better way has been found even though there already are tools designed and built for its manufacture.

Robert W. Haynes **is Works Manager at Spicer Division of Dana Corporation, which operates eight plants in this country in addition to affiliates abroad. During his connection with the company, Mr. Haynes has had occasion to establish, equip, tool and re-equip and re-tool most of these plants.**

No matter what the job, the first step is to prepare an estimate. This should be done whether the tooling is only for a single operation, brought about by an engineering change, or for an entirely new product. The business of estimating, in detail, the cost of all items necessary to produce a large transmission is a long project, but commonly takes at least two of three forms.

It is not often that a customer or a sales department is content to await the outcome of an involved and meticulous survey. Information on investment required must be forthcoming more rapidly. Hence, the initial estimate is either picking a figure "from the air", or "quick scanning" of the proposed job. In either case, it is always followed by an accurate detailed analysis which sets forth the final figures within which the tool division must function.

As a rule, quick estimating is done from an outline drawing of the product and seldom occupies over half an hour. The quick scanning method, which is the more accurate of the two, consists primarily of having a reasonably complete assembly drawing of the product from which to work. It proceeds to a semi-detailed count—not a write-up—of the operations required, and continues to a multiplication of a rule-of-thumb figure for tools per operation by the number of operations.

The general type of equipment is also determined during the preparation of the final estimate, and this determination is the result of two separate sets of facts although each may have some influence on the other. The first leads to a decision as to what the machine should do.

The second is for deciding who shall build the machine, and that requires a considerable marshalling of facts, some of which have little connection with the job being tooled. Aside from the assumption, for example, that a machine to drill a hole must have means for holding a drill, other questions are:

1. What are restrictions and limitations for holding a part while the operation is performed? The answer is a weighty factor in making a final decision on what the machine should do. With some parts on some operations, the part may be held with locating devices that will not interfere with tool spindles, and operations may be performed in several planes simultaneously or in consecutive sequence. In other cases, conditions may utterly preclude performing more than one operation at a time.

For example, a transmission case may require two operations: (a) Drill and tap; (b) top mill. Answering this first question immediately cancels out remaining problems since, if it is practically impossible to perform more than one operation there is no need to worry about combining operations. Nevertheless, there are always circumstances requiring decision on the next question, which is:

2. Shall operations be combined so that several may be performed at one loading of the part? Here, we run into a maze of serious proportions. In the first place, the quantity of parts to be produced in a unit of time is all-important. And it is not enough to consider only the quantity of the new part for which the new machine is to be purchased; rather, before any sound conclusion can be reached it is also necessary to scan similar parts, already in production, which might profitably be subjected to the proposed combining of operations.

When To Combine Operations

Where a part can be loaded, unloaded and transferred in a few hundredths of a minute, and machine cycle time is a matter of several minutes, there may be serious doubt as to the value of combined operations except in cases of exceptionally large quantities. But, if handling time adds up to an hour, and the machine cycle is only one minute, then the pressure to combine operations becomes terrific.

Finally, before one can decide on combined operations, it is essential to examine the practical aspects. For example, it is usually possible to combine drilling and tapping operations, in that order of sequence, and to finish bore immediately following drilling, but if drilled holes are blind, in the one case, and there is no successful method for removing chips from the holes, then tapping may present a problem. And in the latter case, boring would be inaccurate should the workpiece be deflected either directly or by poor indexing.

This article is a condensation of a paper, by Mr. Haynes, presented in complete form on July 16, 1948, at the recent Machine Tool Sales Refresher Course held at Cornell University, Ithaca, N. Y.

3. How shall operations be combined? Primarily, there are only two operation combinations. In one, the part is fixed and the various tool spindles are grouped around it while, in the other, the part is moved into and through two or more positions and thus passes successively under the various tool spindles. Recently, a third combination—the "transfer machine"—has been applied although, basically, this is a machine of the second type characterized by two marked differences.

Outside of the many minor factors, however, the main point in deciding how to combine operations boils down to whether the operator should move from station to station or remain in one position with the work moved to and from him. In any event—and no matter which type of combination is chosen—the plain fact is that, if we have decided by all these steps that we should combine operations, we are now faced with the big problem of builder and user alike—the special machine. So it is pertinent that we go to the next question.

4. Should anyone ever buy a special machine? That is, anyone outside of those, who, like the big automobile manufacturers, measure output quantities in thousands per day. This question is asked because of a prevalent assumption that the special machine is only for such high-volume producers and high folly for everyone else. Fortunately for all concerned, this assumption is not true.

It happens that the economies of the special machine are largely relative whereas those of the general purpose machine are direct, and this difference confuses many people. Confronted with a choice of buying four standard drill presses for $8000 or one special machine for the same operations for $13,000, it is a simple matter, although not necessarily the logical choice, to select the standard machines and thus save $5000.

Measured By Results

The real basis for a sound selection is: What does one get for the difference in price? For in the majority of cases, the $8000 will be spent anyway and, in return, certain results are expected. The problem is then how much better results may be had for the additional $5000—and it is surprising how often the extra expenditure proves a sound investment.

Now, as regards the second phase of the machine problem, namely: Who shall build the machine? Having gone through the steps just outlined, we end up with a list of equipment which must be built by someone. Much of it is standard, flexible types which require little or no further engineering and which can be obtained from any one of several sources by merely placing an order. Other types are more or less special and demand a different approach.

Here, there are two things which seldom enter into equations although they are considered of prime importance in many quarters. The first of these is price. And here the chief concern should be that the builder make a profit. It is not mutually profitable to do business with a machine tool builder who may go broke next year.

The other is the matter of production per hour. The builder should be called on to declare that his machine will have the necessary power, rigidity, accuracy, and range of speeds, feeds and motions to perform the work the master mechanic wants done. But how much work is obtained from the machine is the responsibility of the master mechanic, not of the builder. Not, in this connection, that the user shouldn't avail himself of the broad experience of the builder, but he should not buy one builder's machine in preference to another merely because the one guarantees a production of 100 pieces per hour while others, more cautious, estimate he should get at least 80 per hour.

Qualifications Of The Builder

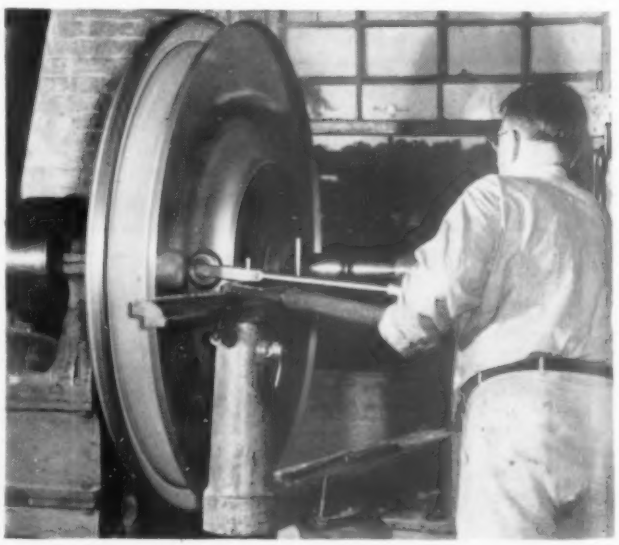
The final selection of builder is based on the result of weighing several factors. The first is delivery, and there the builder's past performance may be taken as a coefficient to evaluate his desirability. In fact, it should be the determining factor as regards the matter of delivery.

The next is the presence—or absence—of machines already performing an operation. For instance, if two automatic lathes of the same make operate in conjunction with a centering machine and it is proposed to add a third lathe, then it certainly should be of the same make regardless of any other factor. In addition, there is the question as to whose turn it may be. Some foremen are frankly prejudiced pro and con as regards certain makes of machine tools, but the master mechanic cannot afford to so center his affections.

One factor, in selecting a builder for special machines, outweighs all others. That is organization, which not only includes necessary trained engineering staffs, experience and adequate manufacturing facilities, but the explosive production qualities which are characteristic of the special machine builder. In the end, however, selection should be based on the record and experience, as well as the character, of the proposing builder.

Things Are Really Spinning

The principle, as well as versatility and economy, of metal spinning is well illustrated by the workman shown spinning a large aluminum cone at the Hartford, Conn., plant of Anemostat Corporation of America. The part being spun, which will serve for one of the units used in assembling an "aspirator" air diffuser for draftless air conditioning, would ordinarily require large and expensive dies for its fabrication. The shape of the spun cone must be closely controlled since the abliity of the device to draw in 35% of room air and to mix it with supply air depends on the accuracy of the cones and their perfect relationship to each other. The cones are spun in sizes ranging from 2 in. to 7 ft. in diameter, as required by specific design. And, because most installations are engineered to fit the particular case, with sizes varying over a wide range, spinning is the most economical production method in view of the comparatively short-run production, piece for piece.



Spinning a large aluminum cone for "aspirator" air diffuser at Hartford, Ct., plant of Anemostat Corporation of America. A roller spinning tool is used to shape the part.

34-91000

Cutting Tools For Engine Lathes

By A. E. Rylander

Installment No. 2 of a Series

We will now apply the cutting tools described in the preceding installment to turning operations on engine lathes. It was previously pointed out that, in rotary cutting, the work is constantly cleared from the tool, and that the greater the diameter of the work, the less the clearance. See Fig. 1, Installment No. 1.

It was further pointed out that faulty angular positioning of the tool might cause it to gouge into the work. This tendency is illustrated in Fig. 7, below. A tool positioned as at A will gouge, while that at B will swing clear under undue cutting pressure. While all this is quite obvious to the experienced user of tools, correct angular positioning is an important consideration at all times and especially so when making tool layouts for heavy cuts.

Positive and Negative Rake

Fig. 8, A and B, shows the difference between positive—or hook—and negative—or shear-cut—cutting tools. The hooked tool at A takes the brunt of the cut on the nose of the tool; furthermore, this tool will have some tendency to gouge as a result of spring under a heavy cut. On the other hand, the negative rake tool shown—at B—takes the brunt of the cut toward the heel, or at point P. This tool has less tendency to gouge and, since there is less wear on the nose, finish will be maintained over a longer period during a long cut.

It should be pointed out that there is no particular advantage in using negative rake on shallow or finishing cuts, since only the nose of the tool would cut under such conditions. Rather, the negative rake tool serves best on heavy roughing cuts and on interrupted cuts, where the angle of the cutting edge serves to bridge the gap of the interruption. See Fig. 9. Later, in this series, we will show negative rake applied to boring operations.

An important consideration in turning tools is the end clearance—or, as it is formally called, the end relief. This

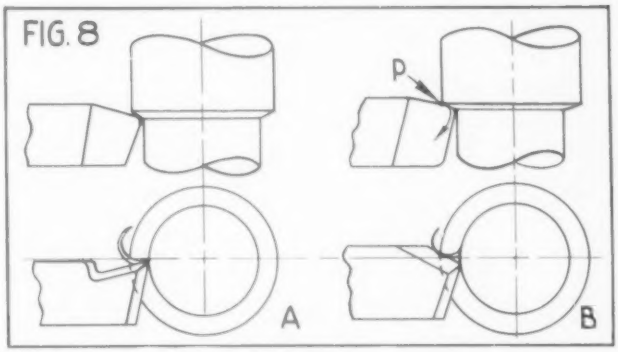


FIG. 8, shows, at A and B, the difference between positive and negative rake tools. With the positive rake, the brunt of the cut comes on the nose of the tool whereas, with the negative rake, the brunt of the cut is taken toward the heel of the cutting edge, as indicated by point P. With the negative rake tool there is a somewhat lesser tendency toward cratering. Also, the nose of the tool will stay sharp longer; therefore, dimeter will be maintained for a longer period on long cuts.

may vary from 8, 10 and 12 degrees, for steel and ferrous materials; from 16 to 20 degrees for brass, and up to 30 degrees for wood. Tools for ferrous materials may be slightly hooked, while tools for turning brass and similar alloys should be flat across the top to prevent gouging into the work. On the other hand, tools for wood turning should be sharply hooked. See Fig. 10, A, B and C.

Turret Tool Posts

Accurate turning, of course, is done with a single point tool firmly clamped. But for mass production turning operations on conventional engine lathes considerable time saving can be effected through use of turret tool posts, of which a number are commercially available. When used in combination with a tail-stock turret, these accessories practically convert

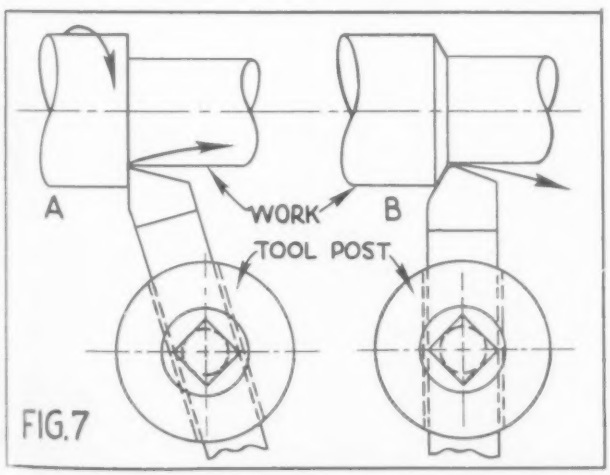


FIG. 7. A tool whose cutting edge is ahead of the toolpost, as at A, might gouge in under heavy cutting pressure. If the gouge should go below the finished diameter, the workpiece may be spoiled as a result. The tool at B will swing clear from the work under undue cutting pressure, with increase in diameter which can later be corrected. If, however, a shoulder is required—as at A—then the bar should be turned with the tool positioned as a B and later swung over to cut the shoulder.

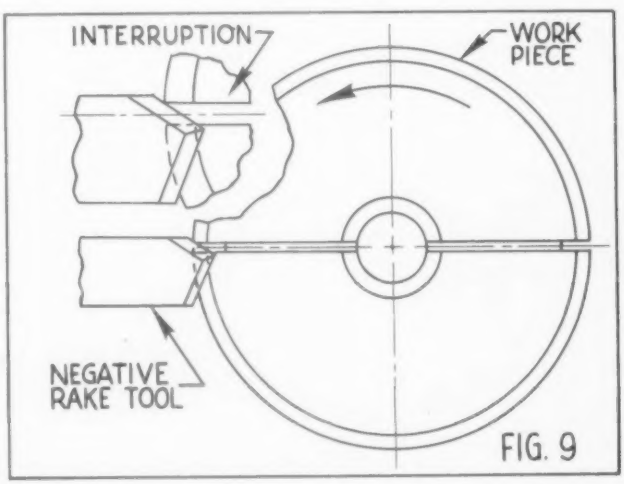


FIG. 9 shows how a negative rake—or shear-cut—tool will bridge the gap on interrupted cuts. The shear angle may be as much as 45° and, at this angle, the heel of the cutting edge may be well into the far side of the interruption while the toe is still cutting on the near side. By thus bridging the gap, there will be less tendency for the workpiece to jump or chatter.

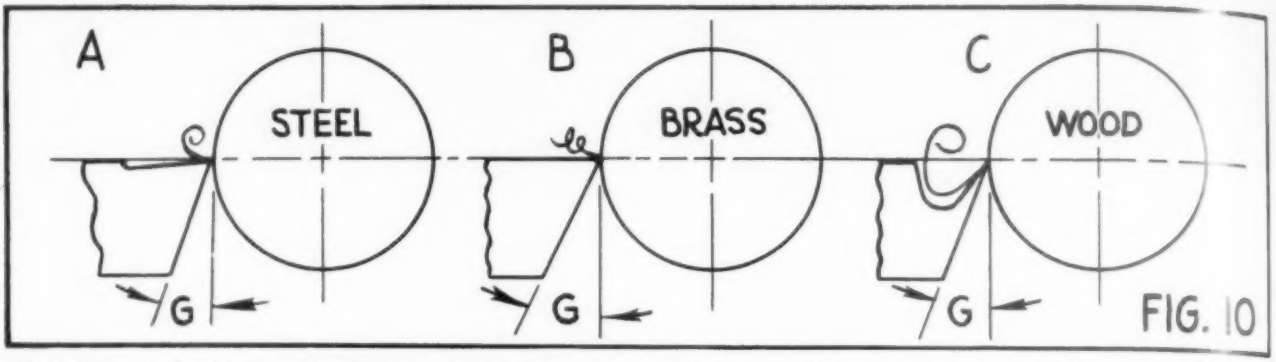


FIG. 10 shows, at A, B and C, the relative end clearance of turning tools for ferrous materials, such as steel, brass and wood. For ferrous metals, the end relief G may vary from 8 to 12 degrees; for brass, from 16 to 20 degrees, and for wood, up to 30 degrees. Tools for steel may be slightly hooked; tools for brass and similar alloys should be flat, while tools for wood turning should be sharply hooked.

the engine lathe into a manually operated turret lathe. See Fig. 11, in which tools A, B, C and D are successfully used for turning, shouldering, grooving and knurling operations.

While it is not proposed to go into speeds and feeds in this series except as these are directly applied to some specific operation, there are times when a progressively variable speed is a decided advantage, not so much in straight turning operations as when facing a large wheel or disk. On such work, it should be obvious that speeds suitable for the center of the work would be entirely too fast as the cut approaches the periphery, and vice versa.

For occasional work, speeds may be increased or decreased by means of the stepped speed changes, belt or gear drive. But for mass production work, economy demands progressive and infinitely variable speed changes. Several makes of lathes are now available with variable speed drives.

Chatter Shortens Tool Life

Chatter, caused by backlash in drives or drivers, and vibration, usually caused by work and tool springing away from each other, not only shorten tool life but result in poor surface finish. Therefore, both chatter and vibration must be held to a minimum. Where chatter results from backlash between a driving dog and the face-late slot, this can be stopped with a wood or rubber wedge, a "spring-dog," or even with a wooden clamp riding the ways and tightened on the work just enough to permit turning.

A more "mechanical" gadget, however, is the follower rest, of which several types are available. Either the plain or roller types, as suggested in Fig. 12, have many variations. They prevent the work from springing away from the tool and, since they follow immediately behind the cut, tend to maintain diameters. However, their main function is to reduce vibration and thereby extend tool life.

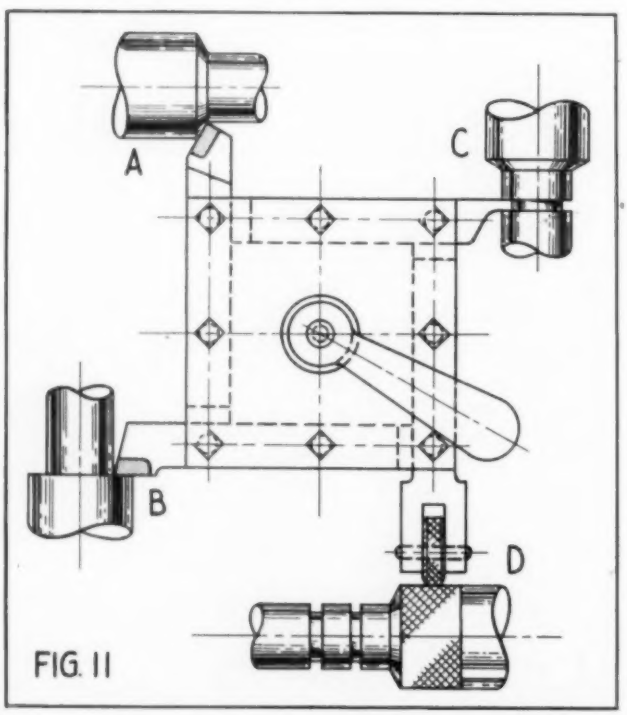


FIG. 11. Turret toolposts permit use of several tools in one setup, thereby saving the time ordinarily lost in changing tools. In this diagram, tool A is used for turning, tool B for cutting the shoulder, tool C for grooving, and tool D for knurling. Turret toolposts save time on multi-operation turning work.

Types of Tool Material

No particular recommendation will be made, here, regarding the steels or alloys used for modern cutting tools. The user has a choice of many kinds and grades, especially in the cemented carbides. 18-4-1 High Speed Steel has been and remains a favorite for general purpose use, both for tool bits and form tools. For the latter purpose, however, it does not produce the fine surface finish obtained with high carbon tool steel but, by way of compensation, has greatly extended tool life.

The cast alloys stand up remarkably under the heat generated by heavy roughing cuts but, being somewhat fragile, must be rigidly supported and used with rigid machines. While not ordinarily recommended for conditions where shock of impact would induce fracture, they can be successfully used even for interrupted cuts if properly backed. This also holds true for the tantalum-tungsten tools which, operating at speeds somewhat slower than for the tungsten carbides, nevertheless show excellent performance under severe operating conditions. Of late, considerable interest has centered on synthetic sapphire for cutting tools, and applications of these tools, as well as the others mentioned above, will be discussed in detail later in the series.

Installment No. 3 will follow in October issue.

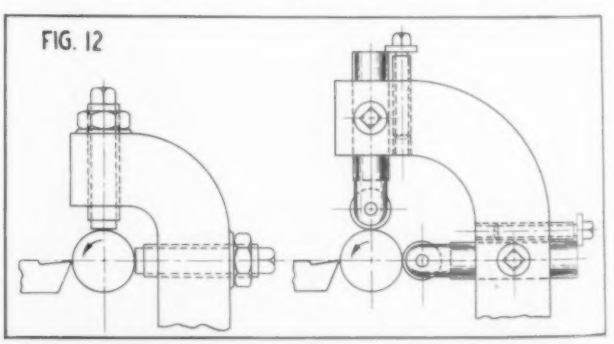


FIG. 12 shows two types of follower rest, the plain type, at left, which employs screws of soft material—as brass or bronze—to bear against the work, and the roller type, shown at right. Follower rests have the advantage over steady rests in that they follow along with and immediately behind the cut and reduce spring and chatter.

GADGETS

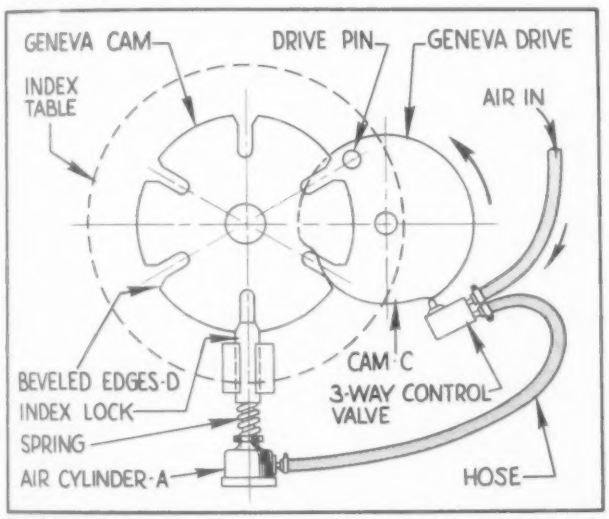
Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Readers in general, and members especially, are cordially invited to submit ideas which may suggest short cuts in manufacture or which may be directly appended to some specific tooling problem. The Tool Engineer will pay $5.00 and up for accepted contributions to our Gadget pages.

Lock for Geneva Index Table

It was found necessary, in connection with a geneva drive used for operating an index table, to provide a positive index lock to prevent any movement of the table during the machining cycle. To effect this purpose, a comparatively simple device, incorporating an air cylinder, was designed and built as illustrated.

A midget-type air cylinder, "A", with 1-inch stroke and provided with a spring return, as shown, is arranged to instantaneously withdraw the index lock "B" when air is exhausted from the cylinder by means of the control valve. The plunger movement of the latter is controlled by the cam "C", which opens the port to the cylinder on the rise of the periphery and exhausts on the drop. Only 3/16 inch plunger movement is required to change from fully-closed to fully-open position.



The plunger of the 3-way valves rides on the periphery of the cam and, on the "drop", exhausts air in the cylinder and withdraws the index lock "B", which is held open until the geneva drive pin has completed its index. A compression spring, between the locking plunger and the gland nut of the cylinder, returns the plunger to locked position. The entire cycle is accurately synchronized.

The cam is part of the geneva drive plate, and plunger movement is so timed that the index lock is withdrawn just as the geneva drive pin enters a slot and starts to index. It likewise engages into the locking position after the geneva pin has completed an index. It will be noted that the slots in the geneva plate are bevelled, as at "D", to suit the plunger and thus insure accurate indexing and locking.

Incidentally, the slide for the lock pawl is not attached to the index table, as suggested by the drawing which, by the way, is purely schematic. Rather, both slide and air cylinder are secured to the base of the index fixture. To suit variations in design, the index table could be provided with equally spaced holes, bushed with hardened and ground bushings, when the lock pawl could be a hardened and ground bullet-nosed pin. However, the principle of operation would be substantially the same. *C. W. Frank*

Clamp for Right Angle Work

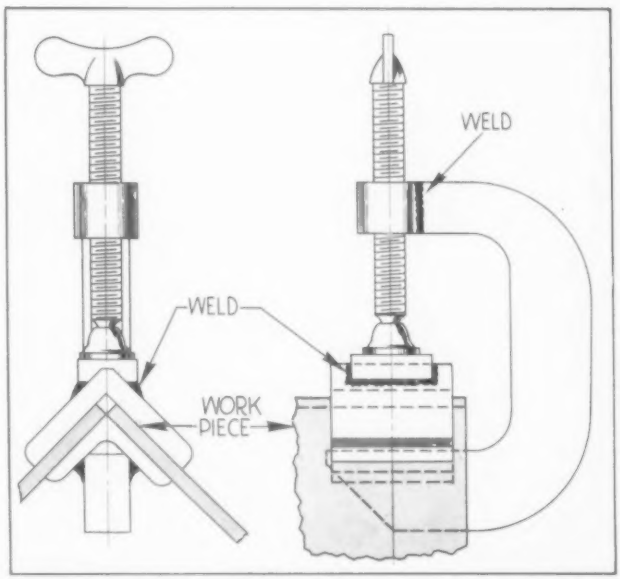
The clamp illustrated will serve to hold a pair of plates at right angles while the plates are being joined by welding. While a standard C-clamp can be used, it is preferable to bend a steel bar into a C-shape, as shown, because the commercial clamp, usually being made of malleable iron, must be brazed rather than homogeneously welded to its component parts.

Both the lower and upper "false jaws" may be made from structural angle iron, although both should be made form fairly heavy gage stock. The lower jaw may retain the corner fillet, but this fillet is preferably removed and the corner made square in the upper or movable jaw so as to insure close mating of the parts being joined.

The method of joining the several components is clearly indicated. The clamp screw is conventional and incorporates a swivel joint to insure equalized grip. It may be noted, however, that where parts to be joined exceed 12 inches in length, two or several clamps should be used.

This clamp is not only very handy for welding jobs but, if made up in several sizes, proves extremely useful in woodworking and pattern shops for screwed, glued or nailed joints where several parts must be joined at right angles to each other.

Clifford T. Bower
Decatur, Georgia



While the clamp shown is designed for right-angle holding of parts to welded or otherwise joined with square corners, the jaws may be made to practically any angle to suit repetitive operations. A commercial clamp can be used, but a steel frame is preferred because of homogeneity of welding.

Retractible Locating Pin

It is often desirable, in fixture design, to incorporate a locating pin or pins which may be momentarily retracted when loading and unloading, so that the part may fall free as soon as the operation is completed. The device shown, which may have many variations, serves that purpose.

A pawl, somewhat similar to an umbrella catch, rides on a ratchet having one tooth. As the ratchet makes a partial rotation, it pulls the pawl which, after a predetermined degree of arc, rides up on the diameter of the ratchet and then releases. The pawl is hinged to the locating pin, which returns to loading position by means of a compression spring. The action is shown in Fig. 1.

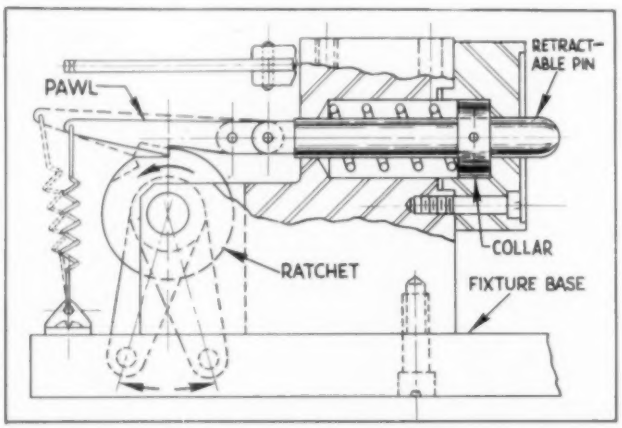


Fig. 1. The locating pin, which is returned to loading position by means of a compression spring, is retracted by an "umbrella catch" type of pawl which disengages when the pawl rides up on the rise of the one-tooth ratchet.

Fig. 2, which has been adapted from Fig. 1 for purpose of clarity, shows one of many applications. Here, a bullet shaped workpiece is to be drilled on one side. It is located from opposite ends of a two-diameter reamed hole, and the larger plunger serves the dual purpose of spring-actuated vise jaw and locator. The plunger has several rack teeth, and is retracted by a pin with movement through a lever connected by a drag link to a foot treadle.

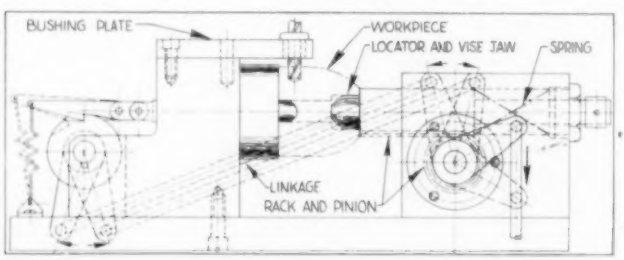


Fig. 2. The retractable locating pin shown incorporated in a drill jig. A spring plunger, shown at right, acts both as locator and vise jaw and wroks in synchrony with the retractable locating pin by means of linkage. This is but one of many applications.

In addition, similar levers on the pinion shaft and the pawl shaft are connected by a linkage; thus, as the foot treadle is depressed, the pawl is rotated simultaneously. However, the retracting locating pin snaps back into place as soon as the workpiece falls free, whereas the larger plunger can remain retracted during the next loading.

As an alternate to the foot treadle, the linkage can be connected directly to the drill press spindle; thus, the operator may load with one hand and operate the spindle lever with the other. A chute may be provided down which the drilled part may roll into a tote box, care being taken to arrest the fall to prevent marring.

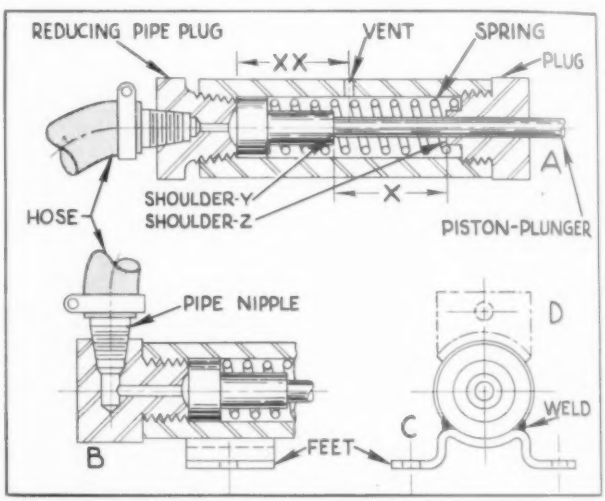
John J. Boe
Detroit, Mich.

Plunger to Eject Work

On drawing or forming operations on inclined presses, the parts may pile up unless the chute to the tote box is steeply sloped. This, however, is a minor problem compared to moving parts from one press to another for successive operations; then, such piling up may be both annoying and time consuming.

The ejection plunger shown readily solves this problem. It is simple and inexpensive to make, consisting mainly of a cylinder and a combination piston and plunger, the latter a comparatively free fit in the cylinder bore. While the cylinder can be made from w. i. pipe, steel tubing is preferred although the inside diameter should closely approximate standard pipe sizes so as to permit tapping or threading for commercial pipe fittings.

For example, if the piston were to be $1\frac{3}{8}$ in. diameter, then standard $1\frac{1}{4}$ in. pipe could be used. This should have an O. D. of 1.660 in., and wall thickness 0.140 in., making the I. D. 1.380 nominally. Therefore, alternative steel tubing should be $1\frac{3}{8}$ in. I. D. x 3/16 in. wall thickness, or about $1\frac{3}{4}$ in. O. D. although a thinner walled tubing could be used.



The pneumatic ejector shown incorporates a cylinder made from W. I. pipe or tubing, and a free running piston-plunger. Air entering hose moves the plunger ahead, and air exhausts through vent. Air is controlled by a valve on the press ram. Shoulders on the plunger and front cylinder head act as stops and prevent the spring from going solid.

Depending on installation—that is, whether vertical or horizontal—air may enter at the end, as shown at A, or from the side, as shown at B. Foot mountings, made of sheet metal, may be welded to the cylinder as shown at C and D, the latter being for vertical mounting where the feet shown at C might interfere.

The stroke, which—designated by X—may be varied to suit the application but which may be comparatively short, is determined by the distance between shoulder Y, on the 3-stepped piston-plunger, and shoulder Z on the plug P. Incidentally, these shoulders are provided to prevent the spring, which encircles them, from compressing to solid. Distance X X, from shut position to the vent V, is the same as X.

To operate, a control valve is attached to the press ram in such a way that it opens on the up-stroke and closes at top of stroke. As air enters the cylinder, the plunger moves quickly forward, kicking the part to the next operating station. When the air is exhausted, the spring returns to piston to closed position. The device can be used on machines other than punch presses.

James Maltby
Garden City, Mich.

Going Our Way

There's Still Time to Get Aboard the Los Angeles Convention Special

TRAIN RESERVATIONS are pouring in . . . banquet tickets are going out . . . hotel rooms are filling up. Everybody's talking about it. From Boston to Seattle, whole families are getting ready for it. It's the ASTE 16th Semi-Annual Meeting at Los Angeles, California, October 11, 12, 13.

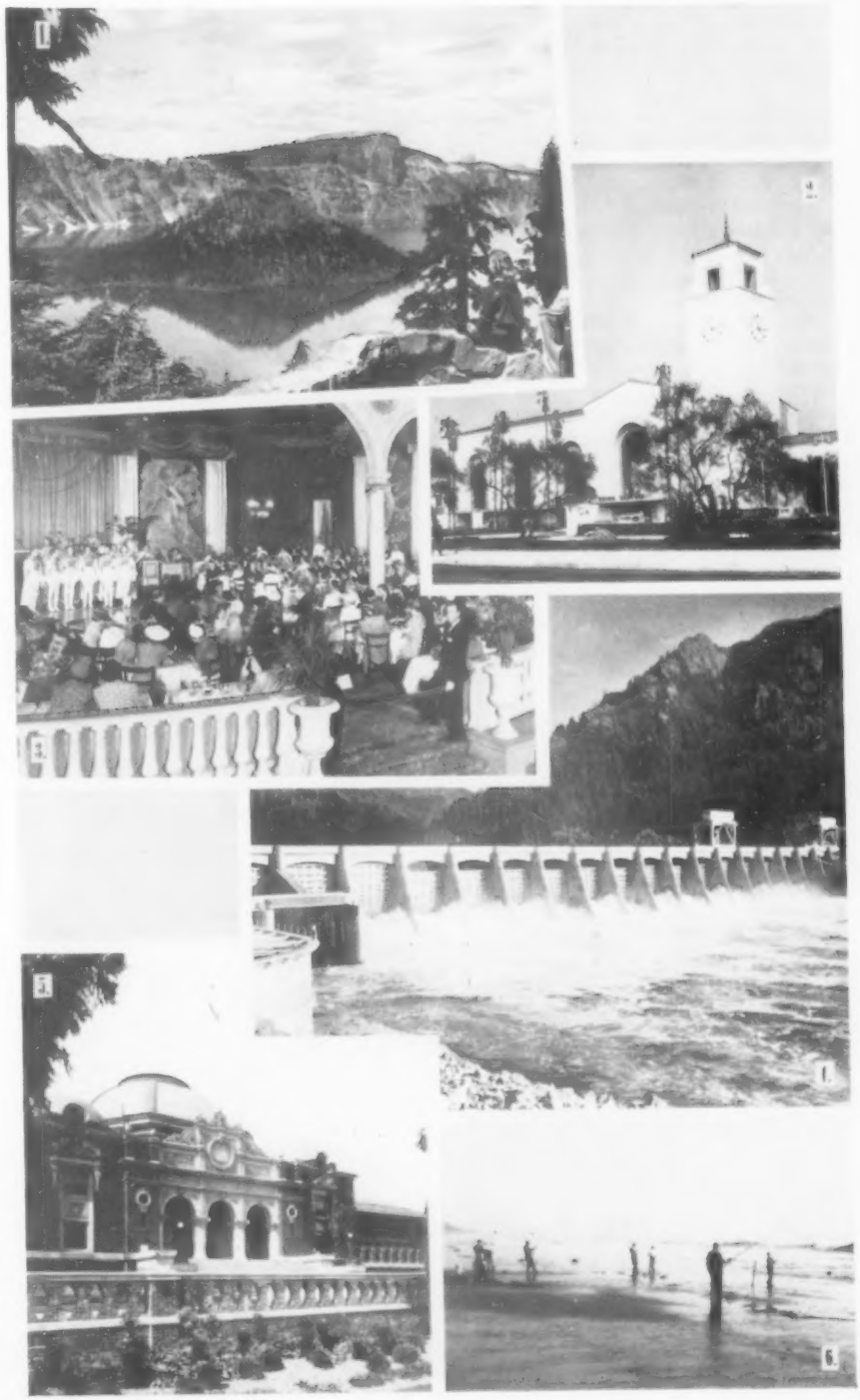
With the "All Aboard" signal at 12:01 Noon, Thursday, October 7, in Chicago's Dearborn Station, the silvery, 11-car, ASTE streamliner will be eagerly off for the West Coast. A three-day getting-acquainted party on wheels, recreation—bridge, games, parties, movies maybe—good eating, comfortable sleeping. And a whole day of sightseeing at awe-inspiring Grand Canyon.

Three more memorable days in Los Angeles—soaking up new technical knowledge, rubbernecking at modern industrial plants, going places, seeing things, at a time when Southern California will be at its best.

Headed by L. F. Hawes, the Host Committee has dreamed up an attractive itinerary of events, both for men and women. National Program Chairman E. W. Baumgardner and his committee have a picked group of western technical men ready to give you new light on tooling problems, a leading Los Angeles industrialist to address the banquet.

But that's not all. On the way home, you can explore the whole Pacific wonderland from Mexico to Canada!

It's not too late to get in on all this—if you move fast. The convention section of your August *Tool Engineer* gives all the dope—even reservation cards for transportation, banquet, hotel accommodations. *¡Hasta la vista!* . . . until Los Angeles.



1. Crater Lake in the high Cascade Mountains of southern Oregon presents an upland sea of blue silence. Filled with melted snows, the 2000-foot depth was a great caldera left when a fiery volcano destroyed itself. 2. The magnificent Union Station, embracing Spanish and Moorish architecture in an Early California manner, will be the ASTE convention goers' introduction to Los Angeles when they alight from their special train. 3. A "Night Club in the Afternoon" is one of the unique features of the Biltmore Hotel, ASTE convention headquarters. 4. Spectacular Bonneville dam, 42 miles east of Portland, Ore., harnesses the limitless energy of the lower Columbia River, provides power for as little as two mills per k.w.h. 5. A browse through the Los Angeles County Museum reveals fossil remains of prehistoric animals, Indian lore, notable art collections. 6. Surf fishing off California beaches is a novelty for the inland angler.

Turbines Pose Problems In Limited Production

Los Angeles, Calif.—In the development of ultra high speed turbines, change, the essence of progress, paces the tool engineer seeking new techniques to lower production costs, Homer J. Woods, Assistant Chief Engineer-Turbines, AiResearch Manufacturing Co., Div. of the Garrett Corp., emphasized in a lecture July 11 before Los Angeles Chapter members.

Mr. Woods' subject was "Production Problems Resulting from Latest Developments in High Speed Turbine Type Rotating Machinery."

On low production, he indicated, quality control poses a problem of whether to design the product in many simple parts with the resultant expensive assembly, or in fewer parts with close tolerances and accompanying scrap. One part cited, with .0002 tolerances on several dimensions and .0002 total indicator reading for runout, had 74 possibilities for discarding it.

Such new techniques as furnace brazing of aluminum—especially where production is limited, precision casting, and machining with the aid of a production duplicator were stressed by the speaker.

Mr. Woods' talk was followed by a sound film, "Product Design and Molding Technique for Thermosetting Plastics," released by the Bakelite Corp. Showing with great clarity methods employed in molding plastics, the motion picture described in precise detail various types of molds, their advantages and limitations. It was considered one of the most educational visualizations presented to the Chapter.

Pontiac Launches Program For Industrial Students

Pontiac, Mich.—A new educational program has been inaugurated by Pontiac Chapter at the General Motors Corp. Truck and Coach Training School.

Stuart Nisbett, Chapter Education Chairman, outlined the program and introduced the students to the tool engineering profession and to the Society during the initial meeting held recently at the school. Problems encountered by the tool engineer were presented by Eldon Hall, Chapter Chairman.

At subsequent meetings the students heard David Livingstone give tips on selecting the right steel for the job, and viewed a sound film on steel manufacture. This month James Mercer and Henry Toma will tell them about cutting tools.

With the opening of the fall semester, the program is being extended to include the Pontiac High School Vocational Department and Pontiac Motors Training School, totaling 150 students.

Other phases of the program are being prepared by members of the Education Committee. Edward Markham has developed plans for a competitive thesis contest, announced to the three schools this month, and Owen Kline is arranging for a series of student plant tours.

Just before breaking camp at the end of a three-day fishing trip, Kansas City Chapter officers, committeemen, and their families have last get-together at Lake of the Ozarks. Amber Brunson (bending over), Past Chairman, cleans the day's catch. Chairman Ward Osborn (seated in foreground) adjusts his motion picture camera for some final sequences. Treasurer Ray Skates and Standards Chairman Ivan Nelson are supported by two small trees at right

Buffalo Announces Awards to Engineering Students

Buffalo, N.Y.—Winners in a technical paper award contest for engineering students have been announced by Buffalo-Niagara Frontier Chapter.

Awards were: First prize, $50, for "The Diamond as an Industrial Tool," by William E. Smith, Buffalo; second, $30, "Inert Gas Welding," by Elton H. Tousing, Clarence, N.Y.; and third, $20, "Quality Control," by Daniel W. G. Roberts, Buffalo.

The contest, open to students of the University of Buffalo Engineering College, was judged by a committee comprising Earl J. Boggan, Sr., Chapter Education Chairman; Aubrey C. Dayman, Treasurer; H. Ieckel, and Professors Thomas and Woodhull of the University faculty.

Entries were judged on: (1) introduction, (2) organization, (3) development of topic—(a) originality, (b) logical sequence of discussion, (c) adequate use of illustrations, and (4) bibliography.

Well written and indicating considerable research on the part of the authors, the winning manuscripts are being considered for processing and distribution to interested Chapter members.

Handbooks Awarded

To encourage higher standards and develop pride in workmanship, the Chapter also awarded "American Machinists' Handbook" to graduates of five local high schools.

Winners had completed the regular four-year course in Machine Shop Practice at a vocational high school or the Tool Design course at Buffalo Technical High School.

They are: Joseph M. Bednarz, Buffalo, Boys Vocational High School; Leonard J. Chudzinski, Cheektowaga, Henry P. Emerson Vocational High School; Norman J. McCormack, Kenmore, Seneca Vocational High School; Henry Kaminski, Lackawanna, Lackawanna Vocational High School; Peter L. Bognar, Buffalo, McKinley Vocational High School; and Allen J. Streit, Buffalo, Buffalo Technical High School.

In each instance the awardee was chosen for outstanding proficiency, character, attendance and scholarship throughout this four-year course. Each winner will be a guest of the Chapter at one of the fall meetings.

The Chapter's first attempts to encourage scholastic excellence in the field of engineering had the wholehearted cooperation of school authorities.

K. C. Party Makes Ozark Fishing Trip

Kansas City, Mo.—Officers, committeemen, former chairmen of Kansas City Chapter, and their families enjoyed a three-day fishing trip, July 16-18, to Purvis Beach on the Lake of the Ozarks near Versailles, Mo.

In addition to angling, the group participated in target shooting, informal discussion sessions, and sightseeing through the Ozark region.

Entertainment Chairman Warren Ricketson made all arrangements for the party.

Other News In This Issue

Hartford Takes Lead in Subscribing for ASTE Bonds

Through decision made at summer meeting of Executive Committee, Hartford holds distinction of being the first Chapter to subscribe to the ASTE 4½ per cent interest bonds, offered in connection with the construction of a Society headquarters building at Detroit. From left are: R. H. Morris, Past President; Henry Kuryla, Chapter Secretary; R. A. Smith, Education Chairman; D. B. Huntting, Second Vice-Chairman; Arthur C. Gustafson, Editorial Chairman; W. F. Jarvis, Chairman; Omer Gingras, Entertainment Chairman; C. S. Parsons, First Vice-Chairman; G. H. Buker, Constitution and By-Laws Chairman; R. F. Edmunds, Treasurer; C. A. Peterson, Standards Committee; H. J. Hauck, Past Chairman; R. M. Toppin, Membership Chairman; and Douglas Proctor, Public Relations Committee

Society Booklet on Prepared Papers in Process

As a result of joint meetings held by national chairmen of the ASTE Program, Public Relations, Editorial, and Education Committees, on the subject of "Prepared Papers," arrangements have been completed for publishing a booklet dealing with fundamentals for the preparation of technical talks and articles.

This booklet, according to Robert B. Douglas, First Vice-President, under whose jurisdiction it is being prepared, will be available to Society members late this month.

Aids in dissemination of Knowledge

Primary purpose of the brochure is to encourage members to prepare technical papers and talks so that knowledge they have gained through research and development may be available to others.

Logically, engineers or technical men in industry are the best qualified to write such papers and articles, but so often they are not sufficiently acquainted with basic writing techniques to put their ideas into manuscript form. Some develop a mental fear and do not attempt to write about their accomplishments. Others overdo their writing and complicate what should normally be an easy undertaking.

In commenting on the proposed booklet, Chairman E. W. Baumgardner of the National Program Committee said, "We are rapidly approaching the day when speakers invited to address national meetings will be requested to present prepared papers. In the not too distant future many local Chapter speakers, too, will follow this procedure.

"A technical audience frequently does not exceed two hundred, often fewer. If the subject is of extreme interest and if the speaker has gone to some effort in preparing his story, it is regrettable that wider coverage is not made possible.

"On the other hand, if the speaker's remarks are prepared in manuscript form, submitted in advance of presentation, and then published in *The Tool Engineer*, thousands of members and others will have the privilege of reading the paper. In this way, the author will be more amply rewarded for his technical contribution."

Chairman Frank W. Curtis, of the National Editorial Committee, commenting on manuscripts submitted for publication in *The Tool Engineer*, pointed out that some authors could have avoided many of the common pitfalls of technical writing, if this booklet had been available for their reference before preparing their articles.

He added, "I feel sure that this booklet will accomplish its aim without any offense. Even the experienced writer will find it handy. After all, writing and speaking are similar mental expressions, so an author should feel as if he were talking, and not try to write anything which he would not say. The keynote of good writing is to be natural; therefore, sincerity and simplicity are essential."

According to Chairman Harry B. Osborn, Jr., of the National Public Relations Committee, the booklet will go far in promoting better relations between members, and should eventually result in the preparation of papers of a higher standard.

Achievements Recorded

Chairman Halsey F. Owen, of the National Education Committee, added that recognition of a man's achievements depends on how effectively he expresses himself in writing. Prepared talks and articles on new developments, processes and techniques are beneficial from an educational standpoint and should be strongly encouraged.

The reputation of any industrial organization is largely the collective thinking of individual engineers and personnel. Therefore, the prestige of both company and individual can be materially enhanced by the presentation of prepared papers.

While there will be no attempt to make this booklet a manual of style, one section will be devoted to abbreviations most commonly used by tool engineers. Use of standard abbreviations is most helpful in editing and preparing manuscripts for publication.

L. A. Groups See Making Of Steel From Ore to Bar

Los Angeles, Calif.—Steel making, from raw materials to finished stock, was viewed by 309 Los Angeles members and guests participating in recent tours of the Fontana Mill of Kaiser Co., Inc.

Starting at the yard where coal, iron ore and limestone are stockpiled, the ASTE parties proceeded to the ovens where they watched coke being ejected after its 20-hour distillation at 2000°. Quenched to prevent burning, it is moved to storage hoppers at the blast furnace.

Groups fortunate enough to arrive at the blast furnace at the time of the "cast" saw the hot metal flow into ladle cars for transfer to the open hearth building.

There the iron is refined into steel at temperatures of approximately 3000°. After some eight hours' processing, the molten steel is poured into molds. At the stripper plant, the molds are lifted. The ingots are then taken to the soaking pits for reheating to a uniform temperature of 2200° for rolling.

Ingots are reduced to slabs or billets at the blooming mill. Slabs go to the plate mill for rolling into plate from 3/16" to 3" thick. Billets entering the structural mill are rolled into structural shapes. At the merchant mill they are made into squares, rounds, strip, small angles, channels, and also "skelp" which is further rolled in the pipe mill.

Only important plant facility not included in the tour was the new pipe mill which is not yet open to visitors.

Relaxing on the green, Detroit members watch E. C. Lomax (right) make a 275-yard drive during the Chapter golf tournament at Indianwood Golf and Country Club

Swingendorf, Golf Champ At Detroit Tournament

Detroit, Mich.—In the annual competion for Detroit Chapter's golf trophy, R. A. Swingendorf captured the championship cup with a low gross score of 79, during an all-day stag outing, July 24, at Indianwood Golf and Country Club, Lake Orion, Mich.

Among those distinguishing themselves on the green were E. C. Lomax of Grand Rapids, who took the prize for the longest drive—275 yards, and "Chuck" Kocsis, winner of the non-member low gross event, with a score of 68.

Horseshoe pitching, swimming and bridge occupied some of the non-golfers among the 300 present. An accordion player and a sound truck, provided by the Entertainment and Food Committee, stimulated all the sports contenders to greater efforts.

W. T. Ackerman headed this committee, assisted by William Fritz, Don Harris, F. L. McKeen, Clyde Rickert, C. Starke and J. Weber.

During the afternoon Mr. Kocsis gave an exhibition of trap shots, irons and drives, while Lloyd Martz and Mr. Lomax demonstrated long drives.

A mid-day buffet lunch, plus cooling beverages on the course, sustained the players until evening, when dinner was served in the clubhouse to 160, with A. R. Conti, General Chairman of the outing, presiding.

Awards were made for the day's events and everyone received an attendance prize. Committee in charge of this activity was chairmanned by J. D. Anderson and included Hamilton Aldridge, Bennett Burgoon, Jr., D. W. McLennan, M. B. Mentley, L. A. Obloy and W. A. Tabler.

Membership Drive Opens

Pontiac, Mich.—An all-out drive for new members will be inaugurated at the September meeting, Ivan Woodhull, Membership Chairman of Pontiac Chapter, has announced.

Charles Staples and H. Phipps have been named captains of rival teams. Progress of the campaign, which runs until the November meeting, will be reported in October. It is rumored that the losing team will be penalized.

Is Your Feature Attraction the "Forgotten Man"?

The Care and Feeding Of Speakers

By C. B. LARRABEE,
Publisher of *Printers' Ink*

Reprinted from *Convention and Trade Shows*

Most European visitors seem always impressed by the friendliness and cordiality of the people who live on our side of the Atlantic.

One reason may be that few of them come over with the specific job of making speeches before luncheon clubs.

It was my good fortune recently to make a talk before the Advertising and Sales Executives Club of Montreal, Canada. I say "good fortune" because here is a club that understands thoroughly the little niceties in the care and feeding of speakers. From the time I arrived in Montreal in the morning until I left late in the evening, the friendly and companionable members of this club made me feel thoroughly at home.

This club is not unique in its skill in handling speakers. Some other clubs make the entertainment of speakers an art. But they are definitely in a small minority.

No One Meets Him

Too often a speaker arrives in a strange city to be met at the station only by the blank stares of people who are expecting somebody else. If he is lucky, he finds a cab and goes to his hotel. Often the club has not even arranged for hotel reservations.

At about the time he feels the lunch will start, the speaker shows himself in the dining room. Usually those members who have assembled look at him as though they wondered how he managed to get in the wrong place. Eventually he introduces himself—and, like as not, the man who is supposed to greet the speaker has not as yet appeared.

Finally, the greeter appears, makes a few half-hearted introductions to those individuals who have not been able to escape in the meantime, and then leads the speaker to the head table. There he is usually left to sit alone for a few minutes, while the president of the club and the program chairman discuss next week's meeting. During the meal his neighbors on the right and left spend most of their time talking to their other neighbors—not to the speaker.

Then the dessert is cleared away, and the speaking is about to begin. Well, almost.

Better Fare Next Week

The chairman tells the speaker that everybody likes to get out by 1:30. The speaker notes that it is at that time 1:10, and he cuts five minutes off his prepared speech. Then five or ten minutes are taken up with announcements, including one by the program chairman, who says, "Next week we shall have a *good* speaker."

At last the speaker is introduced and eight or nine members decide they are in a hurry to get back to the office. When the commotion has died down, the speaker makes his speech, trying his best to compress into 10 or 15 minutes the message he had been asked to deliver in 30.

The speech is over. A couple of people are polite enough to say they have enjoyed it. The chairman says, "Goodbye." And suddenly the speaker finds himself alone at the head table in a room occupied only by waiters.

Not all clubs act that way, thank heaven. But too many do. And then they wonder why they don't get better speakers.

Cope Heads Product Eng'g

Pittsburgh, Pa.—Larry S. Cope, a Pittsburgh ASTE member, has been made head of research and product engineering at Oliver Iron and Steel Corp., in a move marking the beginning of an expanded product development program.

Formerly general manager in charge of production, Mr. Cope has assumed his new duties after an extended leave of absence. In his new capacity, he will direct die and tool engineering, metallurgical and special mechanical engineering and product development.

Tool Design Extension Course Opens at R. I. State
Little Rhody Members Prepare Curriculum

Providence, R. I.—In five years an ample supply of well trained tool designers will be available to the highly diversified industry of the largest city in the country's smallest state, according to plans developed jointly by Little Rhody Chapter, ASTE, and the Rhode Island State College Division of Extension.

Beginning this fall the Extension Division's Technical Institute is conducting a five-year evening course in tool design, first of its kind ever offered in this area.

Differing from other tool design courses which Director J. B. McKee Arthur terms "cafeteria courses," where the student selects his subjects, the planned curriculum parallels a regular college course.

Treated as Science

Good tool designers cannot be produced on short notice—as the United States discovered during the war. Commenting on this situation, R. B. Parker, Chapter Chairman, and President of Columbia Machine Co., Pawtucket, said: "In the past, tool designing has been regarded more as an art or a trade—never as a science. But it is a science, an important one. We plan to treat it as such with our course at R. I. State."

Leading executives of Rhode Island's metal trades industry, drawn largely from the Chapter membership, have prepared the curriculum, under the direction of Frank B. Whittemore of Norton Co., Chapter Education Chairman. Others on the committee are: Gilbert Stafford, Gazda Engineering Co.; Henry Owens, Henry Owens & Co., Inc.; Wilfred Pender, Potter & Johnston Co.; Delbert C. Krahnke, Gorham Mfg. Co.; Lloyd A. Sheeran, Universal Winding Co.

Edward J. Berry, Berry Engineering Service; Fred Kunath, Sandsea Co.; Stanley De Groff, Federal Products Corp.; Eugene A. Siders and Fred Tankard, Hemphill Co.; F. W. Prior, Jr., Enginaire, Inc.; Edward C. Hanna, Rhode Island Tool Co.; Charles E. Blais, Water Supply Board, Providence; Alfred H. Angell, Angell Electroforming Co., and Mr. Parker.

Courses by Industrial Experts

The schedule calls for two three-hour evening sessions each week for a 16-week semester. There will be two semesters a year—totaling 960 hours for the five-year period.

Algebra, trigonometry and technical drawing will be taught the first year. Students will receive descriptive geometry, principles of tool design and applied mechanics the second year. Starting with the third year, courses prepared by experts from local industries will be given.

Metallurgy of Tool Steels, a course prepared by Prof. Kenneth H. Mairs of R. I. State College, will reach into heat treatment of high speed steels and influence of furnace atmospheres.

E. A. Siders of Hemphill Co. has written a course, Principles of Tool Making, including an extensive review of types of machine tools used and types of tools made in tool rooms, the making of milling fixtures, drilling jigs, and specialization in tool making.

The Inspection Methods and Gage Design course, prepared by Stanley de Groff of Federal Products Corp., covers advanced gaging methods, problems of inspection, statistical quality control and organization of gage and inspection departments.

Delbert Krahnke of Gorham Mfg. Co. is author of the course, Manufacturing Processes for Metal Working, a study of processes employed in manufacturing goods and equipment, of machines available for metal forming, machining, press work, permanent metal joining, and control gaging in these processes.

Dies—low production, piercing, shearing, blanking, progressive, combination, and extruding—form the subject matter of the course, Practical Die Making, developed by F. W. Kunath of Sandsea Co. R. B. Parker of Columbia Machine Co. was responsible for the Manufacturing Analysis course, comprising methods analysis, operation sheets, designing for production, time study and tool estimating.

A course in Application of Standard Tooling Accessories is devoted to laws and characteristics of fluids, gases, electricity and electronics, and will include equipment and applications of hydraulic, pneumatic, electrical and electronics standard tooling accessories. It was written by Lloyd A. Sheeran of Universal Winding Co.

The new college extension course is not the Chapter's first venture in promoting formal engineering education. In 1945 when the Providence Department of Education established a trade school and technical training institute, Little Rhody members served in an advisory capacity in setting up the course of study for the engineering curricula.

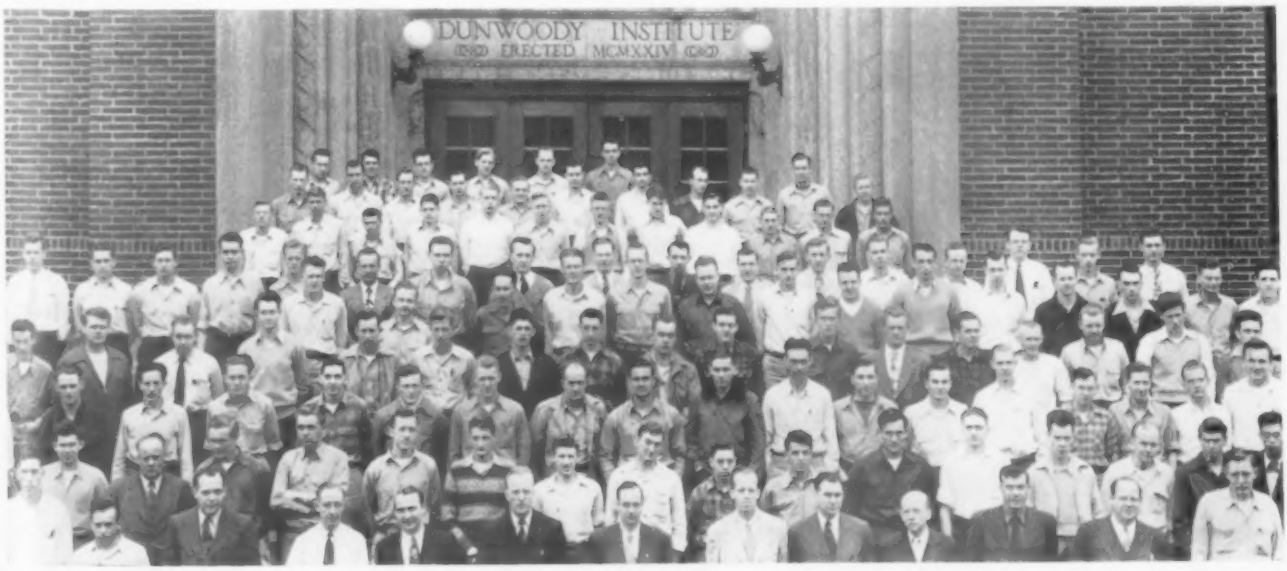
Sports Feature Picnic

Rochester, N. Y.—Approximately 100 Rochester members and guests competed in baseball and other sports highlighting the Chapter's Tenth Annual Picnic, held this summer at Buholtz Picnic Grounds.

In the afternoon the hungry athletes were served a buffet lunch. Prizes were awarded for prowess in sports and for attendance.

Twin City Officer Heads Dunwoody Machine Shop Department

Shown with a group of his students in the Machine Shop Department at Dunwoody Industrial Institute at Minneapolis, Minn., is Loren C. Blanchar, Department Head (seventh from left, front row). Mr. Blanchar, Secretary of Twin City Chapter, ASTE, is in charge of instructors (also in front row) who teach machine work and mechanical drafting. During the past year nearly 6000 have received technical instruction in many fields, both in day school pre-employment training and in evening school extension work. Athough the institution was founded primarily for Minnesota residents, students came from 39 states and 14 other lands. Last month, Dunwoody began its 35th year.



Prof. MacCrehan Directs Ordnance Conference

During recent one-day ordnance gage conference at New York University College of Engineering, Prof. W. A. MacCrehan (left), Director of N. Y. U.'s gage laboratory, chats with Brig. Gen. J. L. Holman, Chief of the Industrial Div. of the Army's Office of Ordnance and a speaker at the forum, "What a Prepared Industry Can Do to Shorten the Mobilization Cycle." Professor MacCrehan, a member of Boston Chapter, ASTE, conducted the conference attended by key production men

Frank Hausfeld, Jr. (left), 1947 Chairman of Evansville Chapter, receives Past Chairman pin from Norman Kneise at the Chapter's third annual summer picnic

Rosy Industrial Future Predicted for Seattle

Seattle, Wash.—How problems facing a city when it invites new industry are being overcome in Seattle was explained to Seattle members by James E. Louttit, Manager, Industrial Department, Seattle Chamber of Commerce, who addressed a recent Chapter meeting.

Importance of the tool engineer's role in the past development and future expansion of Northwest industry also was stressed by Mr. Louttit in his talk, "The Future of Manufacturing in the Puget Sound Region and Its Relationship with Tool Engineering."

The speaker congratulated the Chapter upon the success achieved in its efforts to gain recognition for tool engineers.

Evansville Holds Picnic

Evansville, Ind.—On July 12, 55 members of Evansville Chapter gathered at the Servel Picnic Grounds for their Third Annual Summer Picnic.

During a brief business meeting Norman Kneise presented a Past Chairman pin to Frank Hausfeld, Jr.

Walter P. Schneider and Roy Ackerman served as picnic co-chairmen.

Our Society

By HARRY E. CONRAD, *ASTE Executive Secretary*

The ASTE Building Program takes over the spotlight and no doubt will be the major topic of discussion wherever ASTE'rs gather for some time to come. Construction progress has been very satisfactory and it is safe to assume that, by the time this prediction appears in print, the roof will be on the building and all outside work completed. Moving day will be the last day in October.

These are busy days. Just to give you an idea, the last week in July carried two meetings—the Editorial Committee and the special meeting of the committee chairmen under First Vice President Bob Douglas' supervision. Both meetings were very productive and a program of greater member interest and participation will be the end result. A detailed official announcement of the new program will be made at the Semi-Annual Meeting in October in Los Angeles.

National Committees Active

National committee reports are due on August 16th along with budget estimates and will have to be processed and compiled for presentation at the elected officers meeting which will be held on August 28 and 29. The next step in the processing of this information will be the consideration of the Finance Committee at their meeting to be held in September. Just for good measure, there will also be meetings of the Education Committee, September 18 and 19; another meeting of the Editorial Committee on August 28 and 29 and, in addition, a meeting of the Professional Engineering Committee is projected for the latter part of August or early September.

Excellent progress is being made on the final details of the Semi-Annual Meeting in Los Angeles and there is every indication, both from the program that has been arranged as well as from the standpoint of attendance, that this meeting will be most successful.

Commended by Nazi

A rather unusual incident occurred during the past week when an ex-serviceman came into the office to inquire about membership in ASTE. I talked with the gentleman at some length and during the course of conversation, I asked him how he had learned of ASTE and its activities and his reply was most interesting. It seemed that during 1943, he had been taken a prisoner of war and was in prison in a German prison of war camp known as Luftstalagevi VI. He was unable to tell me the location of this camp due to the fact that he had been flown in and flown out and all he knew was that the camp was located seven air hours out of London somewhere in Germany. But the most amazing thing was the story he told me about one of the German guards at the camp telling him about the American Society of Tool Engineers. This guard, at one time prior to the war, had been employed at one of the automobile plants here in Detroit and could speak English exceptionally well. He knew all about the American Society of Tool Engineers and told this G.I. that if he ever got back to the United States, tool engineering would be a good profession for him to follow and, by all means, he should affiliate himself with the ASTE. All which goes to prove that ASTE certainly gets around.

Coming Meetings

AKRON—September 13. Speaker: George Edgerton, Lincoln Park Industries. Subject: "Design of Carbide Dies." October 11. Dinner, Benders Restaurant, Canton, followed by tour through Hoover Co., North Canton.

BOSTON—October 14, New England Mutual Hall. Speaker: A. J. Snyder, Vice-Pres. and Works Mgr., Morse Twist Drill Co., New Bedford. Subject: "Small Hole Drilling and Tapping." Also: Dr. Albert C. Hall, Director, Dynamic Analysis and Control Laboratory, Massachusetts Institute of Technology, Cambridge. Subject: "Guided Missiles."

CHICAGO—September 13, 6:30 P. M., Furniture Club of America. Speaker: W. Livingston of Janmat Control Office, Chicago Ordnance District. Subject: "Armed Forces Machine Tool Reserve." Colored slides of Ladies Night will be shown. October 4, same place. Speaker: Wade R. Weaver, Vice-Pres., American Society for Quality Control. Subject: "Quality Control."

ELMIRA—September 13, 7:00 P. M., Mark Twain Hotel. Speaker: Earl W. Daugherty, Whitman and Barnes Co., Chicago. Subject: "Drill and Reamer Applications."

FOND DU LAC—October 8, 6:30 P. M., Green Bay, Wis. Speaker: A. G. Bryant, Pres., National Machine Tool Builders Assoc., and Vice-Pres., Cleereman Machine Tool Co., Chicago. Subject: "Current Affairs in Europe as They Affect the Machine Tool Industry." Toastmaster: Walter J. Kohler, Jr., Pres., Vollrath Co., Sheboygan, Wis.

LOS ANGELES—October 11, 12, 13. ASTE 16th Semi-Annual Meeting, Hotel Biltmore. Board of Directors Meeting, October 12.

TWIN STATES—Annual Outing, September 18, Windsor Country Club, Windsor, Vt.

Varied Sports Schedule Features Family Outing

Philadelphia, Pa.—After a morning of threatening rain, Philadelphia Chapter was favored with a beautiful day for its Second Annual Outing, held this summer at Philadelphia Rifle Club.

Registration, which opened the day's events, totalled an official nose count of 260 men, women and children.

A quoits tournament, won by F. Van Osten, was followed by a seven-inning baseball game between National Director T. J. Donovan's "Bums" and former Chapter Secretary W. W. Cady's "Wiseguys." The Bums triumphed 8-4 after a very spirited and rousing contest.

Armchair Games for Unathletic

Byron Gates, Chapter Secretary, carried off the honors in golf pitching and W. F. Whiteman's team were victors in a tug-of-war. Those less strenuously inclined amused themselves with "Bingo" and card games.

Picnic games were under the direction of W. S. Chalfont, Harry Smithgall, Standards Co-Chairman, and Mr. Gates. P. A. Patterson, Scholarship Chairman, umpired the ball game. J. R. Keogh, Jr. and J. J. Danihel conducted Bingo and L. S. Paulsen, Second Vice-Chairman, was in charge of the card games. "Joe" Jovinelly, accordionist, played an accompaniment for the grove games. Friendly keeper of law and order was the Chapter's genial "cop," Michael Lopinski.

A social hour preceded a bountiful dinner and the awarding of 108 door prizes. A. R. Diamond, Constitution and By-Laws Chairman, presented the gifts as they were drawn by Mrs. Paulsen and Mrs. Emil Kitzman.

$500 Scholarship Established

Besides providing a social get together, the outing had a more serious purpose, the sponsoring of a scholarship at Drexel Institute of Technology, Philadelphia.

Experienced in such efforts for other organizations, Mr. Patterson, who heads this activity, has been aided by S. R. Boyer, Chapter Chairman, and Mr. Donovan. Officers, committee chairmen and members have all cooperated in the work. While the present $500 scholarship is for one year, it is hoped eventually to make the award for a four-year term.

During the dinner additional contributions were subscribed to the fund and a drawing was made for a television receiver. This gift was donated through the efforts of David B. Smith Vice-President in charge of Engineering and Research, and Palmer Craig, Chief Radio and Television Engineer, Philco Corp.; and E. O. Burton, Chapter member.

A floor show and dancing concluded the program.

Heads Machine Service

Bridgeport, Conn.—Grant J. Casserly of Fairfield County Chapter has been appointed head of the Machine Service Department, The Allison Co. Mr. Casserly was formerly an Allison service engineer.

Obituaries—

Edward L. Greer

A veteran of 27 years' service with Canadian Fairbanks-Morse Co., Ltd., Edward L. Greer, 49, recently succumbed to a short illness in Hamilton Hospital.

Born in Oxford Mills, Ont., Mr. Greer had lived in Burlington since 1941. For many years he was manager of the Hamilton office of his company. At the time of his death he managed the Machinery Department at Toronto.

During the first World War, he served with the 38th Battalion of the Canadian forces. Besides holding membership in Hamilton Chapter, ASTE, he was affiliated with the Engineers Club of Toronto, Toronto Board of Trade, and St. Luke's Anglican Church in Burlington, Ont.

He served two terms as Secretary of his ASTE Chapter, and two as Canadian Area Vice-Chairman of the Society's National Constitution and By-Laws Committee.

Joseph P. Stapleton

Joseph P. Stapleton, partner in Oatis-Booth Machinery Co., Toledo, passed away following a brief illness, June 1, less than a month before his 47th birthday.

Born in Toledo, Mr. Stapleton was educated in the public schools there. For 20 years he was associated with the National Supply Co., before joining Oatis-Booth Machinery Co. eight years ago.

He belonged to the Foremen's Club and had been a member of Toledo Chapter, ASTE, since 1943.

Ralph R. Weddell

Ralph R. Weddell, President, Weddell Tools, Inc., Rochester, N. Y., passed away July 17 following a brief illness.

Mr. Weddell graduated from Lane Technical High School and Armour Institute of Technology, both of Chicago. For nine years he was Chief Engineer and Sales Manager of The O. K. Tool Co., Shelton, Conn. After many business trips abroad for this firm, as Consulting Engineer to Richard Lloyd & Co., Birmingham, England, he supervised the establishment of a tool factory there in 1933 and 1934.

Then he managed the Ingersoll Milling Machine Cutter Div., at Rockford, Ill., coming to Rochester in 1939 as Chief Engineer of the Modern Tool Works Div. of Consolidated Machine Tool Corp. Five years later he formed his own company to manufacture inserted blade cutting tools and accessories.

Mr. Weddell had addressed national and local meetings of ASTE, was a member of the Society's Chapter at Rochester and of the Rochester Ad Club.

Made Warehouse Manager

Chicago, Ill.—J. J. Gardenhire, of Chicago ASTE Chapter, has been appointed manager of the Chicago warehouse recently established by Wendt-Sonis Co., at 1361 West Lake St.

Mr. Gardenhire was formerly service engineer for the Hannibal, Mo., manufacturer of carbide cutting tools.

Top: A light-footed couple dance the Irish Jig to Joe Jovinelly's accordion accompaniment; (below): as P. A. Patterson gives the signal, these tool engineers hobble off in three-legged race at Philadelphia's annual outing

Directory of A.S.T.E. Chapter Chairmen

AKRON, NO. 47
Second Monday *
George A. Irwin, *Chairman*
243 Malacca Ave.
Akron, Ohio

ATLANTA, NO. 61
Third Monday *
George W. Brown, *Chairman*
Big A. Road,
Toccoa, Ga.

BALTIMORE, NO. 13
First Wednesday *
George A. Exley, *Chairman*
Bendix Radio Div.
E. Joppa Road, Towson
Baltimore 4, Md.

BINGHAMTON, NO. 35
Second Wednesday *
Roger E. Coles, *Chairman*
506 Mountain View Dr.,
Union, N. Y.

BOSTON, NO. 33
Second Thursday *
William W. Young, *Chairman*
Pratt & Whitney Div.
238 Main St.,
Cambridge, Mass.

BUFFALO-NIAGARA FRONTIER, NO. 10
Second Wednesday *
Garrett Kingston, *Chairman*
38 Schauf St.,
Buffalo 11, N. Y.

CEDAR RAPIDS, NO. 71
Third Wednesday *
Raymond E. Bextine, *Chairman*
Link-Belt Speeder Corp.
1201 Sixth St., S. W.,
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA NO. 22
Second Tuesday *
Albert Anderson, *Chairman*
446 N. Duke St.,
Lancaster, Pa.

CHICAGO, NO. 5
First Monday *
Harold M. Taylor, *Chairman*
Supplies, Inc.
564 W. Adams St.,
Chicago 6, Ill.

CINCINNATI, NO. 21
Second Tuesday *
George H. Simon, *Chairman*
7 W. Pike St.,
Covington, Ky.

CLEVELAND, NO. 3
Second Friday *
Jack H. Schron, *Chairman*
Glenn Tool & Mfg. Co.
716 E. 163rd St.,
Cleveland 10, Ohio

COLUMBUS, NO. 36
Second Wednesday *
Albert W. Montague, *Chairman*
829 Vernon Rd.,
Columbus 9, Ohio

DAYTON, NO. 18
Second Monday *
E. J Seifreat, *Chairman*
1006 Harries Bldg.,
Dayton, Ohio

DECATUR, NO. 58
Second Monday *
Fred W. Sobottka, *Chairman*
1620 E. Cleveland Ave.,
Decatur, Ill.

DENVER, NO. 77
First Wednesday *
Ben J. Hazewinkel, *Chairman*
2355 Jasmine St.,
Denver 7, Colo.

DETROIT, NO. 1
Second Thursday *
Andrew Carnegie, *Chairman*
2970 W. Grand Blvd.,
Detroit 2, Mich.

ELMIRA, NO. 24
First Monday *
James F. Deegan, *Chairman*
Lower Maple Ave.,
Elmira, N. Y.

ERIE, NO. 62
First Tuesday *
Vincent Peck, *Chairman*
1110 W. 30th St.,
Erie, Pa.

EVANSVILLE, NO. 73
Second Monday *
Clyde E. Yost, *Chairman*
700 Villa Dr.,
Evansville, Ind.

FAIRFIELD CTY., NO. 6
First Wednesday *
William C. McDonough, *Chairman*
R.F.D. 2, Danbury Rd.,
Wilton, Conn.

FLINT, NO. 68
Third Thursday
Ralph W. Cook, *Chairman*
1037 Gladwyn,
Flint 4, Mich.

FOND DU LAC, NO. 45
Second Friday *
Jule P. Schommer, *Chairman*
59 Polk St., Oshkosh, Wis.

FORT WAYNE, NO. 56
Second Wednesday *
Leonard Roebel, *Chairman*
206 E. Sherwood Terrace,
Ft. Wayne, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Roger F. Waindle, *Chairman*
123 So. Jackson Ave.,
Batavia, Ill.

GOLDEN GATE, NO. 28
Third Tuesday *
Ernest C. Holden, *Chairman*
3122 Guido St.,
Oakland 2, Calif.

HAMILTON, NO. 42
Second Friday *
Gordon Hall, *Chairman*
29 Nelson Ave.,
Burlington, Ont.

HARTFORD, NO. 7
First Monday *
William F. Jarvis, *Chairman*
Chas. L. Jarvis Co.
Pease Ave.,
Middletown, Conn.

HOUSTON, NO. 29
Second Tuesday *
Dean Saurenman, *Chairman*
Baker Oil Tools, Inc.
Box 3048, Houston 1, Texas

INDIANAPOLIS, NO. 37
First Thursday *
Clarence M. Wetzel, *Chairman*
4910 E. 12th St.,
Indianapolis, Ind.

KANSAS CITY, NO. 57
First Wednesday *
F. Ward Osborn, *Chairman*
819 West College,
Independence, Mo.

LITTLE RHODY, NO. 53
Third Wednesday *
Robert B. Parker, *Chairman*
76 Ferncrest Ave.,
Edgewood, R. I.

LOS ANGELES, NO. 27
Second Thursday *
Leslie F. Hawes, *Chairman*
2616 W. 78th Pl.,
Inglewood, Calif.

LOUISVILLE, NO. 54
Second Wednesday
John A. Black, *Chairman*
3733 N. Western Pkwy.,
Louisville 12, Ky.

MADISON, NO. 75
1st Tues. After 1st Mon. *
Lorenz A. Leifer, *Chairman*
13 Oxford Pl.,
Madison 4, Wis.

MID-HUDSON, NO. 74
Second Tuesday *
Llewellyn H. Tenney, *Chairman*
76 Grand Ave.,
Poughkeepsie, N. Y.

MILWAUKEE, NO. 4
Second Thursday *
Joseph Ebner, *Chairman*
4215 N. 26th St.,
Milwaukee, Wis.

MONTREAL, NO. 50
Second Thursday *
G. S. Clarke, *Chairman*
1135 Joliette
Coteau Rouge Rd.,
Longueuil, Que.

MUNCIE, NO. 70
Second Wednesday *
William J. Brown, *Chairman*
1212 Bundy Court,
New Castle, Ind.

NASHVILLE, NO. 43
Third Friday *
C. L. McCaffrey, *Chairman*
1513 Ashwood Ave.,
Nashville, Tenn.

NEW HAVEN, NO. 41
Second Thursday *
Alton V. Pollard, *Chairman*
American Brass Co.
55 Liberty St.,
Ansonia, Conn.

NEW ORLEANS, NO. 60
Second Wednesday *
Carl Hazlewood, *Chairman*
6574 General Haig,
New Orleans 19, La.

NEW YORK, GREATER, NO. 34
First Monday *
W. H. Lentz, *Chairman*
630 Victory Blvd., Grymes Hill,
Staten Island, N. Y.

NIAGARA DISTRICT, NO. 65
First Thursday *
H. F. Gorth, *Chairman*
62 Thomas St.,
St. Catharines, Ont.

NORTH TEXAS, NO. 51
Second Friday *
John A. Lapham, *Chairman*
2700 Western Ave.,
Fort Worth 7, Texas

NORTHERN NEW JERSEY, NO. 14
Second Tuesday *
Charles B. Carlson, *Chairman*
Ediphone Division
Thomas Edison, Inc.
West Orange, N. J.

PEORIA, NO. 31
First Tuesday *
Gordon Swardenski, *Chairman*
214 Weiman Ave.,
Bartonville 7, Ill.

PHILADELPHIA, NO. 15
Third Thursday *
Samuel R. Boyer, *Chairman*
5865 Hadfield St.,
Philadelphia 43, Pa.

PITTSBURGH, NO. 8
First Friday *
Walter S. Risser, *Chairman*
1332 Franklin Ave.,
Pittsburgh 21, Pa.

PONTIAC, NO. 69
Third Thursday *
Eldon Hall, *Chairman*
5048 Mound Rd.,
Warren, Mich.

PORTLAND (MAINE), NO. 46
Fourth Friday *
Harold D. Andrews, *Chairman*
Twin City Machine Co.
31 Mechanics Row
Auburn, Maine

PORTLAND (OREGON), NO. 63
Last Tuesday *
Everett Werner, *Chairman*
2919 S.E. Clay Ave.,
Portland 15, Ore.

POTOMAC, NO. 48
First Thursday *
Daniel T. Hilleary, *Chairman*
116 N. Highland St.,
Arlington, Va.

RACINE, NO. 2
First Monday *
William Reinhardt, Jr., *Chairman*
837 Blaine Blvd.,
Racine, Wis.

RICHMOND, NO. 66
Second Tuesday *
Ralph McKee, *Chairman*
Webster, Ind.

ROCHESTER, NO. 16
First Monday *
H. O. Simon, *Chairman*
94 Harvington Dr.,
Rochester 12, N. Y.

ROCKFORD, NO. 12
First Thursday *
H. A. Nelson, *Chairman*
Barber Colman Co.
150 Loomis St.,
Rockford, Ill.

ST. LOUIS, NO. 17
First Thursday *
Harrel M. Creasey, *Chairman*
Box 708-6, Route 6,
Sappington 23, Mo.

SAN DIEGO, NO. 44
Second Tuesday *
Raymond W. Peters, *Chairman*
6952 Fitch Court,
San Diego 11, Calif.

SCHENECTADY, NO. 20
Second Thursday *
Ray E. Ellis, *Chairman*
1448 Myron St.,
Schenectady 8, N. Y.

SEATTLE, NO. 39
Second Tuesday *
Clyde A. Peterson, *Chairman*
Rt. 2, Box 210
Bellevue, Wash.

SOUTH BEND, NO. 30
Second Tuesday *
Norman R. Smith, *Chairman*
3941 Cottage Ave.,
Mishawaka, Ind.

SPRINGFIELD (ILLINOIS), NO. 64
First Tuesday *
H. C. Chambers, *Chairman*
1817 Dial Court,
Springfield, Ill.

SPRINGFIELD (MASS.), NO. 32
Second Monday *
George R. Brown, *Chairman*
52 Barber St.,
Springfield, Mass.

SPRINGFIELD (OHIO), NO. 76
Fourth Thursday *
Joseph E. Charters, *Chairman*
The Oliver Corp.
270 Monroe St.,
Springfield 99, Ohio

SYRACUSE, NO. 19
Second Tuesday *
Lester H. Collins, *Chairman*
177 Ridgeway Ave.,
Syracuse, N. Y.

TOLEDO, NO. 9
Second Wednesday *
Lawrence F. Rothert, *Chairman*
6021 Acres Rd.,
Sylvania, Ohio

TORONTO, NO. 26
First Wednesday *
John W. Lengbridge, *Chairman*
257 Wychwood Ave.,
Toronto, Ont.

TRI CITIES, NO. 23
First Wednesday *
E. B. Benson, *Chairman*
2440 27th St.,
Moline, Ill.

TWIN CITIES, NO. 11
First Wednesday *
Harold D. Sullivan, *Chairman*
4038 28th Ave. S.
Minneapolis 6, Minn.

TWIN STATES, NO. 40
Second Wednesday *
W. C. Hadfield, *Chairman*
33 Pine St., Springfield, Vt.

WESTERN MICHIGAN, NO. 38
Second Monday *
Edmund E. Cedarquist, *Chairman*
523 Fremont Ave. N.W.,
Grand Rapids 4, Mich.

WICHITA, NO. 52
Second Wednesday *
Leigh S. Icke, *Chairman*
657 N. Terrace Dr.,
Wichita 6, Kansas

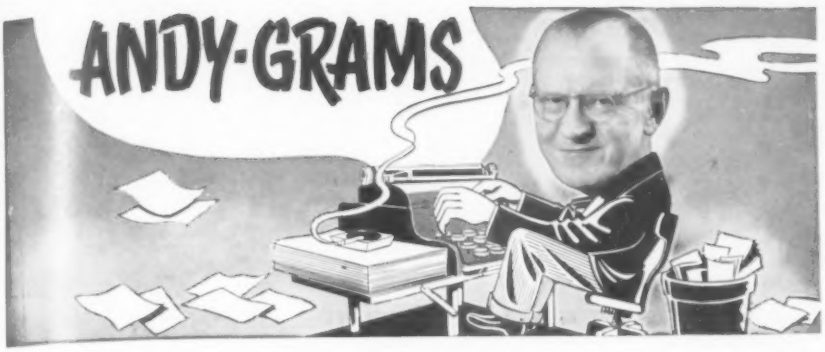
WILLIAMSPORT, NO. 49
Second Monday *
Delbert M. Lowrey, *Chairman*
1233 Park Ave.,
Williamsport, Pa.

WINDSOR, NO. 55
Second Monday *
Alfred J. Hodgins, *Chairman*
995 Lawrence Rd.,
Windsor, Ont.

WORCESTER, NO. 25
First Tuesday *
Ralph E. Rawling, *Chairman*
22 Elm St., Shrewsbury, Mass

*CHAPTER MEETING NIGHT

ANDY-GRAMS



I see by the papers where there's a lot of concern about juvenile delinquency, for which ascribable causes include comics, parental inadequacy and postwar demoralization, all according to the personal viewpoint. And to an extent, I'd say that they're all contributing factors although I'd be inclined to put a lot of blame on moral zealots who, with the best of intentions, usually succeed in making things worse instead of better.

Personally, I can't see the average so-called comic as contributing either to enjoyment or moral uplift. They just don't evoke a belly-laugh any more, which reminds me of the time, years ago, when I had bought a Sunday paper just before boarding an interurban to call on the one and only—who still is.

I became absorbed in the paper, and finally turned to the funnies. There, something tickled my risibility and, entirely oblivious of fellow passengers, I let loose an explosive guffaw. And for the rest of the trip the whole car was in titters, the while I hid behind the outspread paper. Wonder it didn't catch fire, my face was that red.

Today, very few comics are funny, the most being in the nature of a continued novel or "whodunnit" slanted more toward adults than children. At that, I like Gasoline Alley, not because it's actually funny but because it has humor and human interest. It's clean as a whistle and natural as life itself.

As a boy, I was a "dime (5¢) novel" addict and avidly followed the careers of Frank Merriwell, Diamond Dick, Nick Carter, the James Boys and all the rest in which the bad man always bit the dust and virtue triumphed in the end. And in my opinion, if any boy ever went wrong it wasn't because of the dime novel. But, the moralists ruled 'em out—and now look what we've got! Torture, murder, rapine and argot of the gutter all dished up for juvenile readers.

Sure, the dime novel was taboo with the *pater*—he read 'em when he thought I wasn't looking—who'd come gum-shoeing along the hall at night to catch me reading in bed. But, there was a loose board in the floor, and I'd always hear a warning creak in time to blow out the candle and start snoring. Yep, them were the days!

Looking back, I can truthfully say that, as a boy, I never committed a mean or underhanded act. But, there were times when the "gang"—and what boy isn't gregarious?—would go beyond bounds, and while I had no personal share in that I'd be blamed with the rest. And when this was reported home I'd get me a good application of strap-oil as a deterrent to future mischief. A good, old-fashioned remedy for juvenile delinquency that could well be applied today.

So, I'd say that a great deal of the blame, if not all, for juvenile delinquency rests with the parents. Spare the rod and spoil the child—and here, don't get the idea that I believe in whipping. But when deserved, application of a birch switch to the right spot often works wonders where moral suasion fails to bring results. All within reason, of course.

A few years ago, I bought a grapevine—cost about 39c—and in the course of time it produced bushels of grapes of which we managed to get a few. 'Teen agers from "across the tracks"—boys 15 to 18—made successive raids, tearing down fences and creating havoc in general. We finally caught them red-handed, when I decided to call on the parents.

Without exception, the homes were poorly kept up and the yards devoid of grass, this despite that the family heads were earning good money and, in some cases, both man and wife were working. And the invariable reply to my complaint was: "Well, so what? I ain't got time to watch my kids—too many of 'em. Besides, what's a few grapes?" When I offered to furnish seed, and even to buy grapevines if they or their boys would sow and plant, I was told that "they had no time."

About wartime demoralization, I've two sons-in-law who saw plenty of action in the late war. They were fine boys before the fracas, and gentlemen on return. And that goes for scores of their buddies, fine, upstanding youngsters of whom any parent would be proud. Sure, I've run across a few hard cases of whom some were plenty refined in the Army, by token of which I'd say that UMT would reduce juvenile delinquency by a considerable margin. That, and strap-oil applied on the right place.

Well, that's one side of the story. Going across the street a few minutes ago for a cup of coffee and a brief respite from the grind, I found the Fort Shelby lobby thronged with youngsters convened for a model airplane meet. Clean looking, eager boys—yes, and a few girls as well—all typical of the "makers of things" who, collectively, help make America great. And fortunately for the future of our country, this type comprises the great majority.

In the event that the term "across the tracks" be misinterpreted, let me say that I refer to a condition, not a location. Even the slums produce their great, and in these days of housing shortage even the best of people must live where they can find shelter; for that matter, juvenile hoodlumism is rampant even in our swankiest residential sections. So what's the score?

From my viewpoint, it boils down largely to idleness and boredom. In my time, many boys went to work in their early 'teens (started my apprenticeship at 13) and completed education—grade and high school—in night schools. Today, the kids are at school until 18, and, except for the minority that takes vocational courses, are graduated without training for a livelihood. As far as boys are concerned, UMT would inure boys to discipline the while it bridged a gap of idleness. I may not be right, but them's my sentiments.

Children should be taught the dignity of labor and pride in community. And there, pride starts with the home. Let a boy do the chores, and a girl help mother with household duties, and you have the makings of proud home owners and useful citizens. And provide playgrounds and recreational facilities, of which most of our cities are sadly lacking. But most important of all, if we are to eliminate juvenile delinquency, let's educate the parents and make them responsible for the acts of the children.

Well, it's vacation time for most of you boys and no particular Chapter activity except as the ASTEers out Californy way are readying up for the Semi-Annual. Got to get around to get the news. So, I was fishing around for a theme when the model airplaners mentioned above provided inspiration. May their model planes soar as high as their hopes! Fact is I've been so buried in work of late that I haven't been able to see the forest for the trees, the more so since I've been all alone to boot a/c Doc Nordquist left to go with Carboloy Company where I wish both parties good luck mutually. Doc's a hard and conscientious worker.

From one thing to another, I want to call attention to an omission in the August issue. In the "How of a Materials Handling Survey," by E. A. Ryder, a footnote crediting General Electric Company with the source of the material was omitted. The article was condensed from a manual on Materials Handling, put out by G-E, which makes mighty "good reading." Sorry about the omission and hope this acknowledgement makes amends.

Well, this chore winds up copy for the September book, and now to get readied up for October. That done, I'm going to take time out for long-neglected personal repairs. Can't let myself go to pot a/c all the plans I've got for the future. But for now, au revoir.

ASTEely yours,

Andy

THE TOOL ENGINEER'S *Service Bureau*

FREE BOOKLETS AND CATALOGS CURRENTLY OFFERED BY MANUFACTURERS

Blowers

"Lungs for Industry," 16-page bulletin, describes an all-inclusive line of turbo blowers, gas boosters, multiblade exhausters, furnace blowers, exhaust fans, ventilators, spray booth fans, and allied equipment. *General Blower Co.*, Morton Grove, Ill.

Chain Drives, Stock

Catalog C 71-48 not only lists the many standard silent chain and sprocket drives, but offers a wealth of data for the correct selection of drives. Also included is information on construction, service factors, installation and maintenance of drives. *Morse Chain Co.*, 7601 Central Ave., Detroit 8.

Cutting Tools, Carbide

Covering a line of carbide-cutting tools, 24-page catalog lists taper shanked drills; masonry, glass, and core drills; chucking and shell reamers; and "harduty" jobber drills which eliminate necessity for annealing hardened material before drilling. Included are recommended speeds for drills and reamers and a conversion table for determining the correct rpm for any diameter. *Chicago-Latrobe Twist Drill Works*, 411 W. Ontario, Chicago 10.

Cutting Tools, Carbide

Revised tool catalog 48-T covers the line of standard Talide tools and tips, identified according to the classification system recently adopted by the carbide industry. Useful brazing, grinding, and machining data is included. *Metal Carbides Corp'n*, Youngstown, O.

Cutting Tools, High Speed

A 72-page catalog (No. 48) covers the complete line of high speed metal cutting tools, including straight and taper shanked end mills, special small end mills, Woodruff keyseat cutters, and other milling cutters; metal slitting saws, circular knives, and special saws; and miscellaneous tools. Several pages of recommended speeds and other engineering data are included. *Reltool Corp'n*, 712 W. Michigan St., Milwaukee 3, Wis.

Cutters, Milling and Boring

The 76-page catalog No. 56 describes in detail the complete line of inserted blade milling and boring tools, including the recently-developed series of carbide tipped Shear Clear face mills for steel and cast iron. Most cutters are available with h.s. steel, cast alloy, or carbide tipped blades. *The Ingersoll Milling Machine Co.*, Rockford, Ill.

Cylinder, Air

Bulletin gives complete information, including mounting dimensions and installation drawings, on air cylinders ranging from 1½ to 14-inch bores. Single and double acting cylinders, with and without spring return, are included. *Miller Motor Co.*, 4027 N. Kedzie Ave., Chicago 18.

Die Casting Machine

Bulletin gives detailed information on universal high-pressure hydraulic die casting machine, available with quick-change hot chamber end for zinc, tin or lead, and cold chamber end for aluminum, magnesium or brass. *The Cleveland Automatic Machines Co.*, Cincinnati 12, O.

Die Heads, Self-Opening

Bulletin 5 covers three styles of the H & G self-opening die heads which feature positive cam-actuated hobbed chasers—Style EE for rotary spindle machines, Style C stationary, Style D for B & S automatics and similar machines. *The Eastern Machine Screw Corp'n.*, New Haven 6, Conn.

Drives, V-Belt

Catalog CD 300—on belt drives for light machinery—lists V-grooved, variable pitch, step cone, and flush hub pulleys; bar stock steel sheaves; shaft collars; flexible couplings; and fractional h.p. V-belts. Included is a cross reference table for determining interchangeability of Congress and competitive belts. *Congress Drives Div'n*, Tann Corp'n, 3750 East Outer Dr., Detroit 12.

Fabrication, Stainless Steel

Bulletin 51 summarizes the broad experience of this firm in custom-built stainless steel equipment of intricate design for all industries. Services available range from design and layout through fabrication and assembly. *Jensen Machinery Co., Inc.*, Bloomfield, N. J.

Grinders, Centreless

Catalog No. 126 describes controlled-cycle machines for centreless grinding of shouldered, multi-diameter, and form pieces, and also illustrates eight types of magazines for automatic feeding of form pieces. *Arthur Scrivener, Ltd.*, Tyburn Rd., Birmingham, England.

Grinders, Face

Bulletin illustrates the Diamond horizontal face grinder and its versatility. Grinder features rugged construction, and ease and facility in operating all controls which are centered in a single working position. *The Bridgeport-Diamond Machine Co.*, 2362 Main St., Stratford, Conn.

Grinding, Surface

"The Art of Blanchard Surface Grinding" is a 42-page pocket handbook of valuable information for the Blanchard operator especially. Topics covered include the specification and application of grinding wheels, loading and holding work, column adjustments, magnetic and clamping fixtures, grinding of non-magnetic and non-metallic pieces, and other operations. *The Blanchard Machine Co.*, 64 State St., Cambridge 39, Mass.

Grinding Oils

"Grinding With Oil," a 20-page booklet, has been completely revised and includes new, useful data on selection of oils and wheels. Among the subjects covered are the application of specific Stuart oils to precision grinding projects, the standard wheel marking system, and hints on the handling of grinding oils. *D. A. Stuart Oil Co.*, 2727-49 South Troy St., Chicago 23.

Grinding Wheel Balancing

Technical bulletin G-583 describes the automatic mechanism for balancing the wheel mount while on the grinding machine, providing unusual economies and accuracy of balance. *Cincinnati Milling and Grinding Machines, Inc.*, Cincinnati 9, O.

Grinding Wheels, High Speed

Catalog of 28 pages lists and describes the many Royalite resin-bonded abrasive grinding wheels and the Vulcanite and Corvite rubber-bonded wheels, used in steel mills, foundries, and metal fabricating plants. Mr. J. A. Fairfield, *U. S. Rubber Co.*, Ft. Wayne, Ind.

Iron, Gray

"Gray Iron—Its Mechanical and Engineering Characteristics and Details for Designing Cast Components" is intended to assist engineers in specifying and designing gray iron components or parts. *Gray Iron Founders' Society, Inc.*, 33 Public Square, Cleveland 13.

Lathes and Accessories

A 36-page catalog, No. 1112, is a comprehensive presentation of the Series 60 engine and toolmakers' lathes, and special accessories. Many close-up views of machine details are included. *The Monarch Machine Tool Co.*, Sidney, O.

Measuring Instrument

(Technical) Bulletin 2160 of 16 pages offers instructions on the use of the Measure-Scope, an optical instrument for precise measurement of angles to within one second of arc and of length to within two millionths of an inch. Typical of uses is checking parallelism of snap gage anvils. *American Instrument Co.*, Silver Spring, Md.

Measuring Instruments

Bulletin 57 illustrates the "Hundred" series of dial indicators, and various dial micrometers, hole gages, thickness measure gage, dial comparators, and other instruments. *B. C. Ames Co.*, Waltham 54, Mass.

Miller Adaptor Unit

The "Millmaster," as announced by 4-page bulletin, will convert the Bridgeport, Fray, and other vertical milling machines for angular milling, for hob and broach cutting, for end-milling, drilling, boring, and milling, and for many other operations, converting the vertical miller into a virtual tool shop. *Bemis & Call Co.*, Springfield, Mass.

Miller, Hand

Bulletin gives full information on the Rouse hand miller, designed for economic small parts production. Machine will take light cuts on brass, aluminum, and similar metals and will do small rounding and burring operations on steel and cast iron. Fixture setups, including indexing head, are available. *H. B. Rouse & Co.*, 3214 No. Wayne Ave., Chicago 14.

Parts, Standard Small

"Small Parts for Better Production," a 32-page catalog, provides full detailed technical information on many types of small parts. Specification charts present data on lock washers, retaining rings, flat and coil springs, welded parts, small and medium stampings, hose clamps, expansion plugs, ball bearing wheels, and other components for many industrial and consumer products. *George K. Garrett Co.*, 1421 Chestnut St., Philadelphia 2, Pa.

Press, Laboratory

Bulletin 4801 describes in detail the 20-ton, self-contained laboratory press. Among the operations this press will handle are briquetting, tensile testing, extracting, molding, and laminating. *The Hydraulic Press Mfg. Co.*, Mount Gilead, O.

Solvent, Hydraulic System

Bulletin describes the non-corrosive Hydro-Solv "A", recently developed for removing gum, sludge, and other contaminants from hydraulic systems. *Swan-Finch Oil Corp'n*, 30 Rockefeller Plaza, West, New York 20.

Special Purpose Machinery

"Special Machinery on a No Risk Basis" outlines the technical services of the firm—particularly in the consultation on design, and building of modern automatic machinery. Included is a partial list of projects successfully completed. *Glass Machinery Co.*, Fairfield, Conn.

Steel, Carburizing

Bulletin describes Rycase, an improved carbon-manganese steel especially adapted to case hardening. With mechanical properties approaching those of costly alloys steels, Rycase offers good machinability, plus hard, deep case with rugged supporting structure. *Joseph T. Ryerson & Son, Inc.*, Box 8000-A, Chicago 80.

Taps, T.C. Plated

Leaflet describes the "T.C." taps, made from high speed steel plated with tungsten, which is then converted to tungsten carbide by means of a unique patented process. These taps offer the toughness of h.s. steel and the wear advantages of tungsten carbide, and last from 4 to 10 times as long as conventional h.s.s. taps. *Ray-Metal Co.*, Walled Lake, Mich.

Thread Millers

Bulletin covers the redesigned Waltham thread milling machines which provide fast, semi-automatic milling of accurate, fine-finished threads on small diameters. Standard and special purpose models are well illustrated. *Edward Blake Co.*, (nat'l distributors for Waltham Machine Works), 634 Commonwealth Ave., Newton Centre 59, Mass.

Trucks, Industrial

A 4-page condensed catalog summarizes, in tabulated form, the principal specifications of fork-lift trucks, towing tractors, and tructractors—both gas and electric battery-powered. *Industrial Truck Div'n., Clark Equipment Co.*, Battle Creek, Mich.

Trucks, Industrial

Twenty-page Bulletin P-673 covers pallet-system applications, recommended pallet design, and catalog data on hand lift and Worksaver electric trucks. Philadelphia Div'n., *The Yale and Towne Mfg. Co.*, Philadelphia, Pa.

Welded Fabrications

Custom fabricators of stainless steel, monel, nickel, and like metals—for corrosion or heat resistance—have issued bulletin illustrating diversified work they have completed and listing necessary job information for fabricators to make proper estimates. *Storrs Welding Co., Inc.*, Meriden Conn.

Welders, Rocker Arm

Four-page bulletin describes the improved line of air-operated standard 30 and 50 KVA rocker arm welders for high production spot welding, ranging from light to medium duty. *Progressive Welder Co.*, 3050 E. Outer Dr., Detroit 12.

Welders' Anti-Spatter Clamps

Available for light or heavy service, welders' clamps—with durable forged steel frame—feature a screw made of special alloy that effectively resists the accumulation of spatter. See Bulletin B-01. *The Cincinnati Tool Co.*, 4010 Montgomery Rd., Cincinnati 12, O.

Welding Symbols

Six-page guide to AWS-standardized welding construction symbols. Planned for designer's quick-reference. *The Lincoln Electric Co.*, Cleveland, O.

GOOD READING

. . . A Guide to Significant Books and Pamphlets of Interest to Tool Engineers

ENGINEERING ORGANIZATION AND METHODS, by **James E. Thompson**, consulting industrial engineer, is intended to aid the technical administrator organize, operate, and control a modern engineering department according to proved techniques. It provides a basic organization plan and supplies detailed procedures for a number of specific departmental functions, including the forms required and their application.

Contents include chapters on organization, operation, planning, standards, drawing control, and the fundamentals of engineering management. Cost analysis and time-charge procedure are subjects covered in the appendix.

This 337-page book may be ordered, at $4.00 per copy, from the *McGraw-Hill Book Co., Inc.*, 330 West 42nd St., New York 18.

TECHNICAL DESCRIPTIVE GEOMETRY, by **B. Leighton Wellman**, Worcester Polytechnic Institute, is designed to serve both as a college text and as a working tool for the industrial designer.

Written in simple language, the author begins with the most elementary concepts and progresses to complex intersection and development problems. Throughout the book, practical applications are used wherever possible, and planes and projections are not left to the imagination.

The ten chapters of instructional material are supplemented by an eleventh chapter of 1,568 problems.

This textbook may be obtained, at $4.00 a copy, from *McGraw-Hill Book Co., Inc.*, 330 West 42nd St., New York 18.

METALS HANDBOOK, 1948 Edition, edited by **Taylor Lyman**, is by far the year's most important contribution to engineering literature. Not since the previous edition, 1939, has a complete compilation of metallurgical facts and figures been attempted. The stimulus of the war's unprecedented requirements on the metals industries gave rise to countless new developments, while the research undertaken revealed a whole new world of metals knowledge previously unexplored. All of this information acquired in recent years is faithfully recorded in the present handbook edition.

While the 1939 edition was remarkable for its authority and completeness, and remained the "bible" of the industry throughout the war, the 1948 handbook is a thorough revision and substantial enlargement. The page size was necessarily increased from the previous 6″ x 9″ to 8″ x 10¾″ with 1444 pages adding up to a book thickness of more than 4″.

More than two-thirds of the 1939 edition has been completely rewritten, while the remainder has been largely revised with the addition of much new material. Numerous entirely new articles are included, and many present material not previously published in any form.

The handbook is divided into four sections: General, Ferrous Metals, Nonferrous Metals, and Constitution of Alloys.

The first of these sections is composed of 74 articles pertaining to metals, processes, or methods in general, or covering information applicable to both ferrous and nonferrous metals. Included for the first time are sections on the mechanical testing and non-destructive inspection of metallic materials. Other new sections relate to dilatometry, wear, oxidation, stress corrosion, and relief of residual stress. A group of articles on induction heating is almost entirely new.

The section devoted to Ferrous Metals offers 131 articles, of which 62 are new. Featured are a correlated set of 10 articles on the alloying elements in steel, a completely new section on hardenability, and a coordinated group of articles on tool steels.

The Nonferrous Metals section contains 102 articles, including for the first time complete discussions of melting, shaping, treating, and corrosion. Specific data for 220 nonferrous metals and alloys are given by a semitabular arrangement in data sheet form.

For this edition, all material on binary and tenary alloys has been gathered into a section on Constitution of Alloys. Included here is the first published extensive collection of alloy phase diagrams, all prepared in a correlated uniform style.

Various tables of contents and indexes provide an unusual convenience and ease in using the book for reference. Careful attention has been given to setting up the main index in such a way as to eliminate confusion and lost time in finding any desired information.

Preparaton of this handbook was begun in 1945 and represents the diligence of 68 subcommittees of the American Society for Metals, and that of about 600 individual authors, each of whom is widely recognized as an authority in the field in which he has written. The "1948 Metals Handbook" is available, at $15.00 per copy, from the publishers, *American Society for Metals*, 7301 Euclid Ave., Cleveland 3, O.

North East West South
IN INDUSTRY

American Roller Die Corp'n, Cleveland, O., has acquired patents and sales rights to a complete line of roll forming machines, automatic cut offs, and other equipment made by the **McKinney Tool and Mfg. Co.** Machines will be marketed under the former McKinney firm's name and bearing the American Roller Die Corp'n "Ardcor" trade name.

The **Deca Company**, with offices at 4 No. Avalon Rd., Great Neck, N. Y., has been organized to distribute an "Electro-Automatic Tool Lifter" for planing and shaping machines adapted to carbide tools.

The Studebaker Corp'n has announced the appointment of **Edward L. Usner**, formerly president of Ross Gear and Tool Co., as Ass't to P. O. Peterson, Vice-Pres. in Charge of Mfg. **George O. Linville**, who joined the tool and die staff in 1915, has been named Master Mechanic.

E. L. Usner

M. S. Curtis

Myron S. Curtis, who joined the **Warner & Swasey Company's** engineering staff in 1940, was appointed Director of Eng'g at a recent meeting of the company's Board of Directors, who also elected Mr. Curtis and **Frank E. Joseph**, attorney, to the Board.

Kearney & Trecker Corp'n of Milwaukee, celebrating its 50th anniversary this year, has acquired the **Walker-Turner Co., Inc.**, Plainfield, N. J. Facilities will remain in Plainfield, where the manufacture of light machine tools will be continued as the Walker-Turner Div'n of the new parent.

The Acme Broach Co., originally organized in 1946 as a Kentucky corporation with operations carried out at Lexington, Ky., has recently moved to a new plant at Milan, Mich. Officers of the company include E. J. Lapointe, Pres., and F. J. Lapointe, Exec. Vice-Pres. and Gen'l Mgr., the latter long a prominent figure in the broaching field. Other officers are I. K. McAdam, Vice-Pres., and H. D. Moon, Sec'y-Treas.

Marvel Engineering Co., producing Synclinal Filters, has moved into larger quarters at 625 W. Jackson Blvd., Chicago 6. The move provides five times the space of the previous plant and marks the firm's third expansion since organizing in 1943.

Waldemar Naujoks, author and formerly manager of the Forged Valve Div'n of Ohio Injector Corp'n, has joined the staff of **Girard Associates**, forge and press shop engineering firm with main offices at Chambersburg, Pa. A specialist in forge shop engineering and development, Mr. Naujoks will head the Girard firm's activities in that field.

W. Naujoks

Two main units of the huge new tractor plant of the **Harry Ferguson Co.**, Detroit, were completed at the end of July, with production expected to commence within sixty days. Plant operations are in charge of **Nils Lou** who held a similar position with the Glenn L. Martin Co., Baltimore, during the war.

Enouraged by the popularity of its weekly two-day course in statistical methods of quality control as related to springs, the **Hunter Spring Co.** (formerly **Hunter Pressed Steel Co.**), Lansdale, Pa., is now offering a biweekly two-day refresher course on "Spring Design and Specification", covering basic spring design, checking spring specifications, controlling the test load, spring materials and stresses, tolerance computation, and other topics.

The **American Society for Metals** has elected **Willard H. Dow** as recipient of the Society's 1948 Medal for the Advancement of Research. Dr. Dow is President of the Dow Chemical Co., Midland, Mich.

To celebrate its third birthday, **Henry & Hutchinson, Inc.**, Decatur, Ga., added 6,000 feet of floor space to its manufacturing facilities, increasing its working force from 160 to 206, who work on a two-hour shift. This youthful but progressive firm's contract work includes the design and manufacture of special machinery and tooling, and a broad range of production work.

M. A. Sievert has been appointed as an engineer in the Technical Service Dept., Aluminum Division, **Reynolds Metals Co.**, Louisville, Ky.

Rite-O Tool and Gage Co., producing the Ritoloy tool line, announces that it is now operating from the firm's new plant at 321 W. Ten-Mile Rd., Hazel Park, Mich.

A $350,000 electric furnace plant at Cap-de-la-Madeleine, Quebec, offering facilities for the manufacture of silicon carbide, has been acquired by **Electro Refractories & Alloys Corp'n**, Buffalo, manufacturers of resin-bonded grinding wheels.

Merz Engineering Co., Indianapolis, manufacturing gaging equipment and other precision instruments and machines, has acquired exclusive patent, manufacturing, and sales rights to the **Jack & Heintz** line of electronic inspection equipment, which will be marketed as the Merz New-Tronic line of gages and sorting machines.

Lovejoy Tool Co., Inc., Springfield, Vt., has announced the purchase of a 3-story building, which offers 33,000 sq. ft. of floor space for greatly expanded production of the Lovejoy inserted-tooth type milling cutters.

Koppers Company, Inc., announces the consolidation of the Shops Div'n and Piston Ring Div'n to form a new Metal Products Division, with operations to continue at Baltimore under the direction of **W. F. Perkins**, Vice-Pres. and Gen'l Mgr.

The **Meehanite Metal Corp'n**, New Rochelle, N. Y., announces that foundries, operated by **I. G. Grawoig & Assoc.**, Chicago, and now in production of Meehanite castings, are **The American Well Works**, Aurora, Ill.; **U. S. Challenge Co.**, Batavia, Ill.; and **Hercules Foundry Div'n, U. S. Challenge Co.**, Centerville, Ia.

A Jeepster, Jeep station wagon, and Jeep station sedan are being offered as grand prizes in a good-housekeeping contest sponsored by **Willys-Overland** among workers in its main plant at Toledo, O.

COMING EVENTS

Sept. 13-17. 1948 AMERICAN INSTRUMENT FAIR, sponsored by The Instrument Society of America, and cooperating societies. Convention Hall, Philadelphia.

Sept. 23-25. 25th ANNUAL CONVENTION, Nat'l Ass'n of Foremen. Benjamin Franklin Hotel, Philadelphia.

Sept. 28-Oct. 1. IRON AND STEEL EXPOSITION AND CONVENTION, sponsored by Ass'n of Iron and Steel Engineers. Public Auditorium, Cleveland, O.

Oct. 13-15. TENTH ANNUAL FORUM, sponsored by the Porcelain Enamel Institute, University of Illinois, Urbana, Ill.

Oct. 18-22. 36th NATIONAL SAFETY CONGRESS AND EXPOSITION, sponsored by Nat'l Safety Council. Chicago, Ill.

Oct. 25-29. NAT'L METAL CONGRESS AND EXPOSITION, 30th Annual Convention, American Society for Metals. Convention Hall, Philadelphia.

Oct. 26-28. Short course on "INSTRUMENTATION FOR THE PROCESS INDUSTRIES", sponsored by Texas A. & M. College, College Sta., Texas.

TOOLS OF TODAY

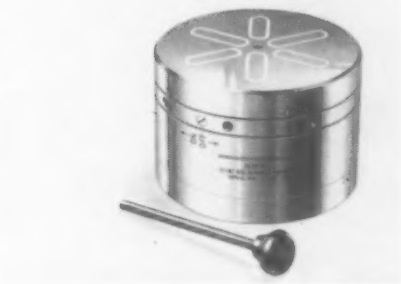
Permanent Magnet Chucks

A line of Permanent Magnet Chucks, by Brown & Sharpe Mfg. Co., Providence 1, R. I., includes chuck No. 408, with working surface 4" x 8" and suited for use on small surface and bench grinders, and for bench work.

Also, Two-Line chuck No. 412, provided with 2-line pole spacers and useful for grinding rows of small parts as well as for intermediate and larger parts. Like the No. 408, this chuck has a 4" x 12" working surface and both are furnished with strap clamps for table mounting.

Rotary Model Magnetic Chucks 5R and 7R are designed to hold work $\frac{3}{4}$" to 5" diameter, and from 1-3/16" to 7" diameter, respectively, and are intended for use with Brown & Sharpe or other cylindrical, tool and disc grinders. With the 5R, strength of holding force is controlled by the amount the control ring is turned. With the 7R, holding strength is controlled by turning the handle. Both chucks may be had with adapters for spindle mounting.

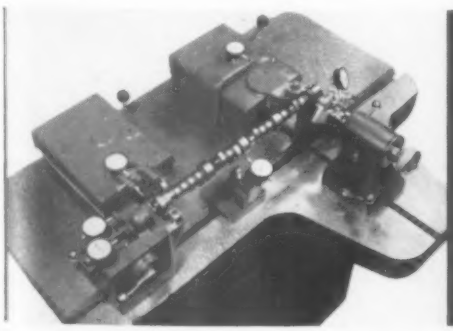
Features claimed for these permanent magnet chucks are ready portability, absence of wires and auxiliary generators, freedom from heating, strong holding power and long life. **T-9-1**

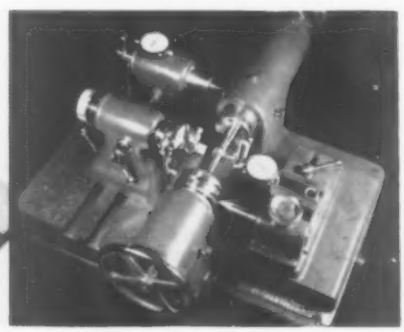


Gear and Cam Shaft Checkers

A combination Gear and Cam Shaft Checker, added to the line of Red Ring gear testing equipment by National Broach and Machine Company, 15600 St. Jean, Detroit 13, Mich., is designed to check camshaft elements which must be held to close dimensions. The tool illustrated, at left, is set up to check the oil pump and distributor drive gear, the mounting flange and dowel pin for the timing gear, the journals and base circles of the cam lobes.

Another addition to the line is a small Red Ring universal gear checker, shown at right, for handling gears up to 10 in. O. D. This tool is readily portable and may be had without the base so that, if desired, the table which carries the checking heads may be used on a bench or elsewhere in the plant. It checks lead, eccentricity and both tooth spacing and tooth parallelism. **T-9-2**





Air Operated Welders

An improved line of standard air operated Rocker Arm Welders, in both 30 and 50 KA capacities and with throat depths ranging from 18 to 36 inches for each capacity, is announced by Progressive Welder Company, 3050 E. Outer Drive, Detroit 12, Mich.

In general construction, these welders follow the structural principles incorporated in Progressive pedestal and press type welders. The front part of the machine, which carries the welding stresses, is of heavy reinforced welded steel construction, while the rear part serves mainly as an enclosure and is provided with quick removable panels to give complete access to the entire interior.

Among features claimed are the following. Three independent water cooling circuits for transformer, lower arm, and upper arm, with sight gages showing circulation through opening in side of the machine; larger range of adjustment of throat opening; optional single operating cylinder or compound retractable stroke cylinder, interchangeable within the machine; and greater rigidity of mounting for electrode holders in arms.

Also, transformer direct couple to welding arms and supported from rigid front column of machine, to increase electrical efficiency; compact air line accessory group, mounted within machine but visible through opening in side panel; and externally accessible heat control.

Water and air systems completely piped to the rear of the machine to facilitate installation and maintenance; and all controls group mounted, except the foot switch, and the entire right side of the machine clear for side mounting of electrical controls if desired. **T-9-3**

For Tool Engineers Service Bureau See Page 56

Hydraulic Machines

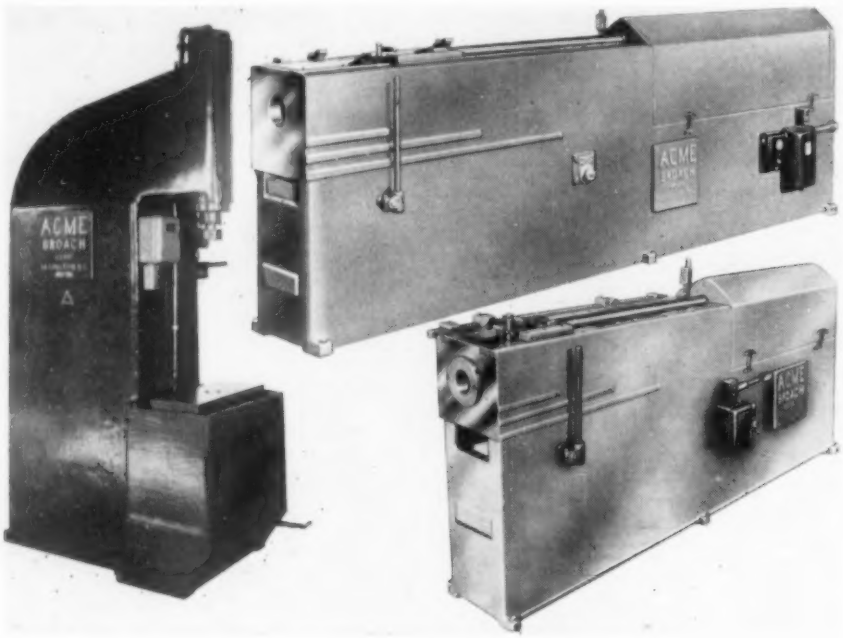
The Acme Broach Company, Milan, Mich., announces a line of hydraulic machines including a 6-ton Vertical Press with 24 in. stroke, shown at left; a 54 in. stroke horizontal Hydraulic Broaching Machine, shown at top, and a smaller 36 in. stroke Broaching Machine, shown at bottom in the photo, all hydraulically operated.

The two latter machines are available in 2, 4 and 6-ton and 6, 10 and 15-ton capacities, respectively. In addition, the company offers a horizontal 66 in. stroke broaching machine in 15 and 20-ton capacities, and a series of 48 in. stroke machines in 2, 4 and 6-ton capacities.

The machines feature easy and convenient vertical adjustment of pull block; precision-honed tubular-type steel cylinders; main pulling cylinder in direct line with face plate bore to assure straight-line pull and to minimize possibility of broach breakage; and a high-speed individual return cylinder.

Besides the 6-ton Vertical Press, the Company also manufactures vertical presses for broaching, pressing and straightening operations in 2 and 4-ton capacities with strokes adjustable to 24 inches, and vertical internal broaching machines and vertical external surface broaching machines in a limited range of strokes and capacities.

The line of manufacture further includes all types of broaching tools, broach pullers, push heads, broach holders and broaching fixtures. **T-9-4**



Finishing Machine

A Polishing and Finishing Machine, added to the line of machine tools by Brown & Sharpe Mfg. Co., Providence 1, R. I., is designed for general all-around polishing, filing, burring and similar operations on small parts.

It is said to be particularly useful for hand tooling and finishing of parts produced on automatic screw machines. Drive is by V-belt, with spindle speeds 4500, 3200 and 2380 RPM. Foot pedal control of collet and brake permits simultaneous opening of collets and stopping of spindle, thus leaving the operator's hands free to load, unload and perform necessary operations. **T-9-5**

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T-9-23 T-9-24 T-9-25 T-9-26 T-9-27 T-9-28 T-9-29 T-9-30 T-9-31 T-9-32 T-9-33
T-9-34 T-9-35 T-9-36 T-9-37 T-9-38 T-9-39 T-9-40 T-9-41 T-9-42 T-9-43 T-9-44

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Six-Spindle Automatic

The New Britain-Gridley Division of The New Britain Machine Company, New Britain, Conn., announces Model 602 multiple spindle Automatic Screw Machine. Designed to be a large size companion to their Model 601—1¼" automatic, this machine is also built to handle carbide tooling and has a standard capacity of 2¼".

The six cross slides are all radial to the center line of the spindle carrier and are 60° apart, a symmetrical radial arrangement that gives the same line of forming thrust in each position and allows interchangeability of tool holders among the five heavy duty forming slides.

Carbide tooling can be applied to this machine because of its over-all weight and ruggedness. Cross silde cams are within the cross slide mountings and, being directly behind the slides, eliminate deflection common with conventional linkage. The increase in chips from high speed carbide production is taken care of by the wide open tooling area, large chip capacity in the pan.

Setup is facilitated since tool holders are interchangeable, cross slide cams readily changed, and attachments conveniently applied. A universal main tool slide adjustment permits the selecting of any ratio of approach to feed without changing high point, drawback, stops, or total stroke. Stock feed out length is adjusted without changing any cams. **T-9-6**

Releasing Tap Holder

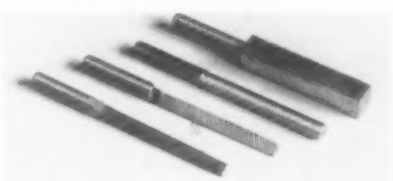
Burg Tool Manufacturing Company, 5028 W. Jefferson Blvd., Dept. TE, Los Angeles 16, Cal., announces an improved "Tool Flex" neoprene mounted releasing Tap Holder designed to simplify tapping on drill presses, engine and turret lathes and screw machines.

Blind hole tapping is facilitated since, when travel is arrested, the holder permits the tap to spin freely with the spindle. On backing out, the holder locks the tap with sufficient end play to minimize tearing of the threads.

The Neoprene mounting absorbs shock and provides sufficient "float" to insure alignment and to permit the tap to follow the drilled hole. **T-9-7**

Carbide Die-Machine Files

Ground Carbide Die-Machine Files, announced by Severance Tool Industries, Inc., Saginaw, Mich., are said to permit alterations or corrections on hardened dies, up to Rockwell 63 C, without the risks involved in annealing and rehardening. This also saves much valuable time.

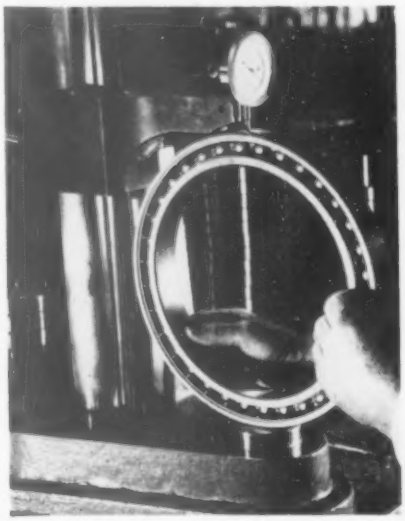


The ground carbide files are claimed to finish faster than the unground type and to considerably outlast carbon files on the usual run of operations. They can be used in die-making, finishing parts, templets, production pieces, and on most any material where a relatively straight surface is to be worked. When used on production parts it is possible to increase output up to 10 times previous experience.

These files, which are offered in four standard shapes—round, square, rectangular—have been produced chiefly for use on die-filing machines. **T-9-8**

Compact Precision Bearings

A line of bearings—Series XLS, by Federal Bearings Company, Poughkeepsie, N. Y.—are said to effect marked savings in weight and space without sacrifice in load bearing strength. Light and compact, with uninterrupted deep-groove races, the bearings are designed to take substantial thrust in either direction in addition to heavy radial loads.



The bearings are made in sizes from 1⅜" to 10" bores, with outside diameters ranging from 2⅛" to 13¼". In the smaller bearings, the cross section area through any pair of races may be only 68% of the area of corresponding light series metric bearings, while in the larger sizes the proportionate area may be only 33⅓%.

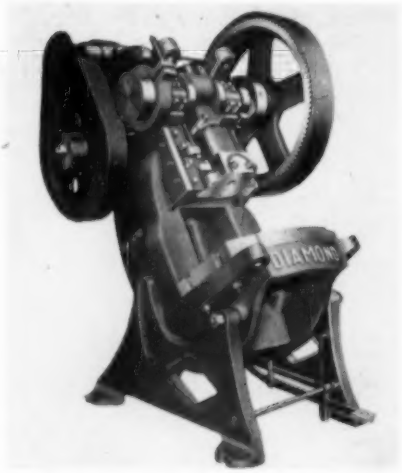
As a result of this compactness, the bearings may find application in compact clutches; in thin walled housings; and for large diameter shafts where high carrying capacity is a secondary consideration with relation to reliable bearing performance. **T-9-9**

Lettering Instrument

A Lettering Instrument, by Varigraph Company, Lincoln 3, Neb., is designed to reproduce letters of various styles and in sizes from about 5/64" to ¾" in height. Letter width and height are controlled by positioning two knobs.

The instrument slides along on a straightedge, and spacing is effected by a finger operated point following the letter grooves in a templet. The instrument is especially designed for use by draftsmen, commercial artists and layout men. **T-9-10**

56-Ton Back-Geared Press



A 56-ton capacity back-geared Punch Press with lower stroke has been added to the line of power punch presses by the Diamond Machine Tool Company, Los Angeles, Cal.

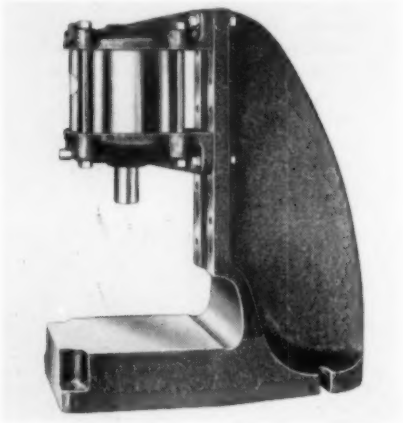
The frame of this press, which is designed to strain gage analysis, is cradle mounted and inclineable up to 35°. A ratchet feed arrangement operates on thrust ball bearings by means of a square threaded screw, and a non-repeat trip mechanism is said to provide simple operation with safe and positive action. Superficial specifications are: Shut die height, 16″; standard stroke, 3″, maximum to order 8″; bed area 21″ x 30″; and strokes per minute, 35. **T-9-11**

Buffing Compound Sprayer

An addition to the "Siefen System" for spraying buffing and polishing compounds to revolving wheels, is announced by J. J. Siefen Company, 5657 Lauderdale, Detroit 9. This addition incorporates an air operated pressure pump to furnish compound to the spray guns. Compound is circulated and returned to the drum, assuring compound to each gun as well as a means of mixing the material in the drum. **T-9-12**

Air-Power Arbor Press

An arbor press, designated as the Bellows Model BAP-20 "Controlled-Air-Power" Arbor Press, has been added to the line of tools manufactured by The Bellows Company, Akron, Ohio. The unit is suitable for light to medium pressing operations such as forming, flaring, stamping, crimping, riveting, as well as light broaching operations.

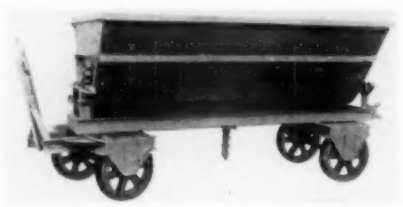


The Model BAP-20 is powered by a special 5½″ bore, Bellows Air Cylinder, developing a thrust of approximately 20 times the operating air line pressure, and may be used on any line pressure ranging from 5 to 175 psi. The air cylinder has a built-in speed control valve which permits infinite variation in the speed of the advance stroke.

Stroke length is adjustable from a fraction of an inch up to 2½″ maximum; maximum clearance of the 1¼″ diameter ram shaft is 7″; and the position of the air cylinder is adjustable vertically in steps of 1½″. Table size is 8″ x 9″ with a throat clearance from the center of the ram of 5″.

The press can be operated with hand or foot control valves, or with safety controls of either the pneumatic or electrical type. **T-9-13**

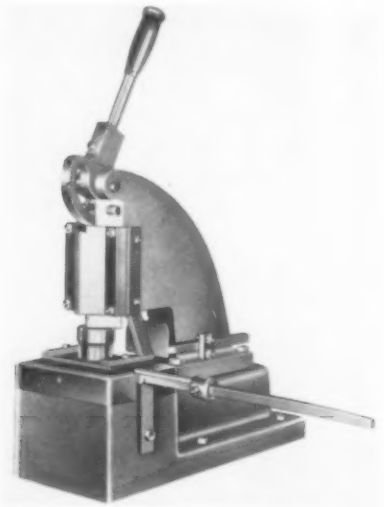
Side Dump Trailer Trucks



A new side Dump Trailer Truck, furnished in two styles and announced by the Palmer-Shile Company, 12621 Mansfield Avenue, Detroit 27, is used in industrial plants for such jobs as collecting, hauling and dumping rubbish, scrap, gravel, metal shavings, borings and similar loads. One style has gear type dumping rockers, while the other style has automatic coupler at rear for train hauling. Dumping is controlled to either right or left side, whichever is desired. **T-9-14**

Punch Added to Di-Acro Line

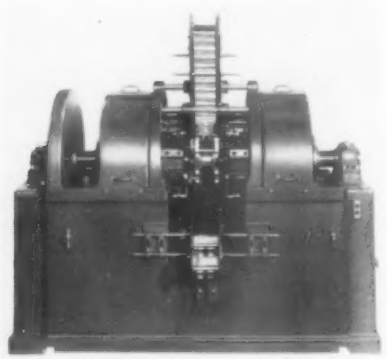
O'Neil-Irwin Mfg. Co., Lake City, Minn., has added a Bench Punch to its Di-Acro line of duplicating equipment. The tool, which is said to have a capacity of 2″ diameter hole in 16 ga. steel plate and up to 4″ in thinner stock, employs a roller bearing cam which converts nominal effort on the operating lever into tremendous pressure at point of impact.



Gaging attachments provide for accurate duplicating and, as a wide variety of interchangeable punches in various shapes are available, the tool is not only adaptable to experimental work but production operations as well. Bed dimensions are 6″ X 7½″, and net weight 175 lbs. **T-9-15**

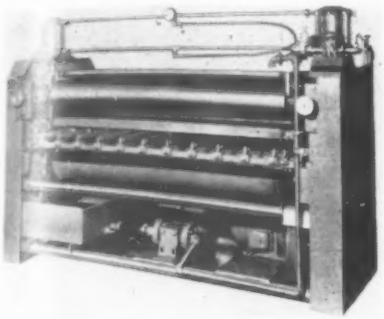
Flanger for Cans

A fully automatic high-speed Flanger for square or rectangular cans, by Lima-Hamilton's Hooven, Owens, Rentschler Co. Division at Hamilton, Ohio, die-flanges both ends of the can simultaneously and is said to produce an even right-angle flange on corners and sides of the can without distorting the can



Known as the Hamilton-Kruse Model No. 40, the flanger is a smooth operating rotary machine consisting of five flanging stations and is completely self-contained with individual motor drive. The unit is designed to handle a maximum of 150 cans a minute. **T-9-16**

Roll Coating Machine



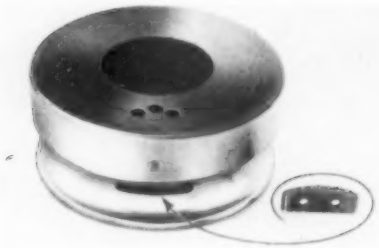
A machine for coating sheet metal or blanked parts with compound prior to drawing is announced by Bertsch Machinery Company, 2832 E. Grand Blvd., Detroit 11, Mich.

This machine provides for fast and even distribution of drawing compound and is designed to eliminate the slow and wasteful hand brushing or spraying.

Compound is applied in any desired quantity through a controlled spreading roll, and sheets up to ¼ in. thick may be coated in widths ranging from 24 to 72 inches.

In addition to drawing compounds, the machine may be used for all types of compounds, including paints and plastic coatings for immediate use or for delayed stamping operations. **T-9-17**

Insert Roll Die

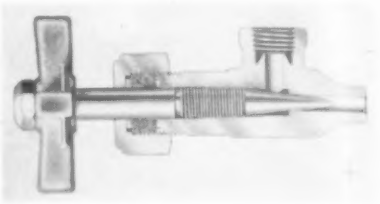


An Insert Roll Die for marking copper or brass pipe and tubing, by the M. E. Cunningham Company, 169 E. Carson St., Pittsburgh, Pa., is identified as the "Kop-R-Tube" Insert Marking Roll and can be furnished for use in marking machines or in standard coiling machines used for coiling the copper tubing. Grooved to suit the size of tubing to be marked, it is equipped with a recess slot for changeable marking die inserts which can be readily changed as they become worn. **T-9-18**

For the Tool Engineers Service Bureau see page 56.

Micrometer Needle Valve

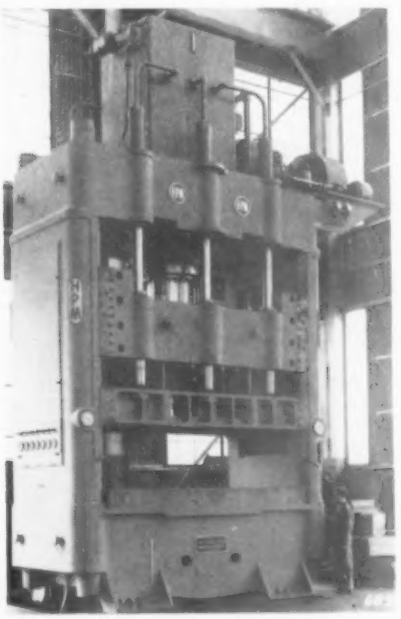
A specially designed Needle Valve for sensitive metering of fluids and gases, developed by the Parker Appliance Company, 17325 Euclid Ave., Cleveland 12, Ohio, is provided with a 5/16"-40 stem, for close adjustment, and 10° included angle tapered needle for fine metering.



The valve, which is available in ⅛" and ¼" sizes, with 8 port combinations of external and internal pipe and tube connections, is regularly furnished in high-strength brass but may also be had with aluminum alloy bodies.
T-9-19

Hydraulic Draw Press

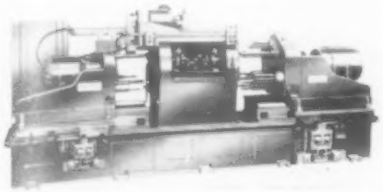
A hydraulic Drawing Press for sheet metal, by the Hydraulic Press Manufacturing Company, Mt. Gilead, Ohio, has a pressing surface of 144" x 84" and provides for drawing up to 22" deep in a single operation using either single or double action dies.



All press actions—punch, blankholder and cushions—are hydraulically operated. The blankholder slide is located directly beneath the main or punch carrying slide. The 120" x 64" die cushion platen, in the press bed, has a stroke of 24". Main slide, blankholder and die cushion pressures are 1000, 400 and 250 tons respectively, and all are powered by a single H-P-M Hydro-Power variable displacement pump.
T-9-20

Special Purpose Machine

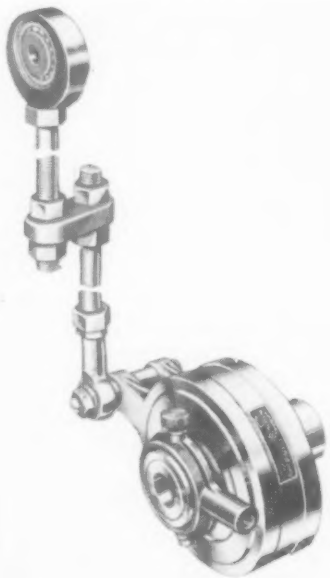
A Special Purpose Machine by Snyder Tool & Engineering Company, Detroit, Mich., combines drilling, counterdrilling, chamfering, tapping and reaming operations on automotive crankshafts and is said to maintain accurate relationship of the holes thus processed.



Tools are carried in multiple spindle heads, with a Geneva indexed six-station trunnion fixture mounted between the heads. Five stations are working positions and one is for loading and unloading.

The stem end of the crank is drilled, counterdrilled, reamed and tapped, the latter operation performed by a lead screw tapping unit mounted on the trunnion housing proper. Production rate is stated to be 65 machine cycles an hour at 80% efficiency. **T-9-21**

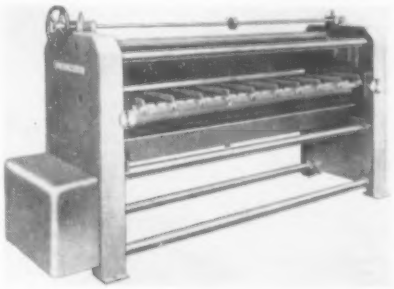
Power Press Feed Unit



A universal Feed Unit for power presses—the Select-O-Matic, by Carl G. Peterson Company, East Providence, R. I.—incorporates an adjustable 210-tooth ratchet and 32 pawls, totally enclosed in an aluminum housing, to provide intermittent and unvarying movement of coil stock through metal stamping machines and punch presses. Actually, only one pawl engages at one time, thereby providing fine feed increment. Used in connection with a 2 in. feed roll, for example, the lineal dimension will be less than 0.001 in. The unit can be attached to most crank-action punch presses, distance to crank being provided by adjustable linkage. **T-9-22**

Compound Coating Machine

Columbia Machinery and Engineering Corp'n, Hamilton, Ohio, announces a Roll Coating Machine for coating flat material with drawing compound, oil, glue, sizing, wax, paint or lacquer.



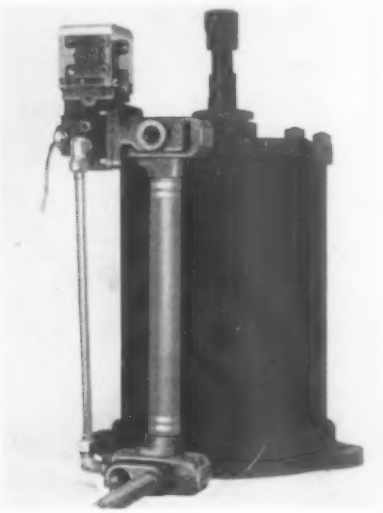
These machines incorporate 10 in. coating rolls and 8 in. doctor rolls. The latter turn at a slower speed, the difference in speeds producing a wiping action contributing to evenness of spread.

The machines are regularly made in four roll arrangements for coating one or both sides of the material, and in roll sizes from 32 in. to 104 in. by 6 in. increments for handling material up to 102 in. wide. Material up to 4 in. thick can be accommondated. **T-9-23**

Air Cylinder Control

A novel approach to the control of air cylinders, developed by Numatics, of Milford, Mich., provides individual control units to be applied directly to the cylinder heads. As claimed by the manufacturer, more work can be performed per cubic foot of air input with this installation, than can be done with a single unit 4-way valve installation.

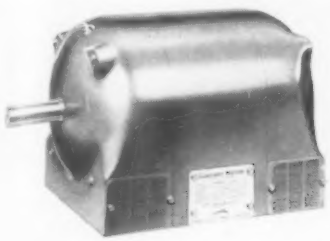
The control units—simple, full capacity 3-way valves screwed directly into the pipe connections of any air cylinder—eliminate all hose or pipe except the one for the supply and a small connector.



With this type of individual unit, users can select their own control—at the cylinder or from a remote location using ¼" tubing or hose from the operating station—for solenoid, combinations of double solenoid, hand, foot, cam, or sequence operation, of either old or new cylinders. Speed can also be controlled by throttling at the individual exhausts. T-9-24

Sanitary Motor

The Louis Allis Co., Milwaukee 7, Wis., is now in production on a Sanitary Motor for use in dairies, food processing and beverage plants, which incorporates novel features intended to materially improve the average machine installation in any type of manufacturing plant where sanitation is essential.



The motor is streamlined and free of cracks, recesses or depressions where milk or food products can collect, and both smaller and larger ratings will be supplied, vermin-proof. All sizes can be washed down to insure maximum sanitation.

Claimed as an outstanding feature is the base construction, enclosed by the motor housing which is finished to a flat surface to prevent the collection of milk or food particles under the motor—one of the biggest objections to the use of the conventional foot mounted motor in an application of this type. Mounting bolt holes, accessible through the removable grille plates, are located in accordance with NEMA standards permitting this motor to be completely interchangeable with motors now in use.

The base design also eliminates the usual projecting conduit box, as the conduit may be brought into the motor through the side or bottom of the motor housing.

The motor will be supplied with the Type C flange, for pump applications, and, for vertical shaft or flange mounted applications, a round frame, non-ventilated motor of streamlined design will be supplied with a conduit box built into the end bracket of the motor.

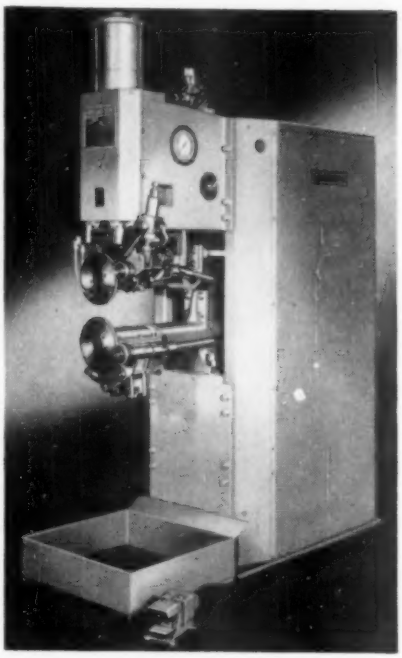
T-9-25

Blind Hole Rotary Broach

Rotary Broaches, developed by Shear-cut Tool Co., Box 746, Reseda, Cal., are designed for use on turret lathes, automatics and other machine tools and will finish cut to bottom of blind holes.

The tool is said to operate on the principle of true broaching by virtue of end pressure; however, there is also a shear-cutting action as a result of rotation as the tool is fed into the work. Stock sizes range from 3/16 in. to 1 in. by increments of 1/32, and up to 1½ in. by increments of 1/16. **T-9-26**

Roller Head Seam Welder



A line of roller-head Seam Welders, announced by Progressive Welder Company, 3050 E. Outer Drive, Detroit 12, Mich., comprises three basic sizes—light, medium and heavy duty—each is available in three types: for circular welding, for longitudinal welding, or for both circular and longitudinal welding, the latter "Universal" models.

Among features claimed for the line is the use of a head completely guided and aligned by four sets of anti-friction rollers, insuring that the welding wheels will follow up and down even extremely small deviations in material thickness and contour. As a result, it is said to be possible to maintain constant weld-pressures even where stock thickness varies along the seam, thus assuring consistent, even weld characteristics.

Other features include ability to change over quickly from circular to longitudinal welding and back again with a minimum of time loss; large throat clearance to accommodate bulky work; and transformer close-coupled to the welding arms to reduce current loss.

Specially developed copper alloys insure adequate strength where needed; and maximum conductivity where this is important.

As a safety feature, drive shafts are non-magnetic and completely insulated, and an adjustable-retractable stroke insures minimum floor-to-floor time in seam welding of parts. The seam welders may be used either for continuous, water or gas tight seam welding, or for roll-spot welding and may be used for cold-rolled steel, stainless or other alloy steels, aluminum and other non-ferrous alloys as well as various types of coated metals. T-9-27

Head Type Punches

A line of head type Punches and round type retainers is announced by Porter Precision Products, Cincinnati 12, Ohio. The first four series of the punches are furnished in a minimum length of $1\frac{1}{2}$" to allow greater range of application especially required in short shut heights.

The retainers are optional in two sizes and furnished in machinable high tension steel with light press fit on the punch body. This combination of firm grip and punches made to precision standards reduces destruction shattering action and provides a precise alignment that increases tool life with resultant increase in output. **T-9-28**

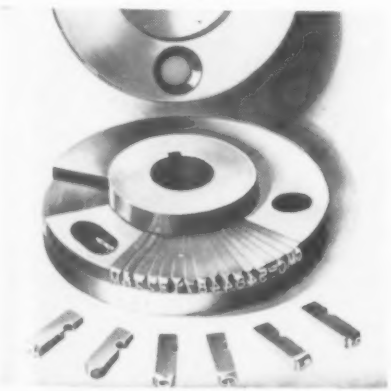
Roll Type Holders

A line of Roll Type Holders, by Acme Marking Equipment Co., 803 Lyndon, Detroit 21, Mich., incorporates interchangeable type inserts and, as a special feature, a compensator segment with elongated hole which, doing away with spacers, permits locking type lines of any length the while eliminating all end play.

The design, which provides for rolling the impressions on, one character at a time, is said to provide greater control with minimum distortion of material marked, and to insure clear and sharp impressions.

Three styles are available: Type D—as illustrated—which provides a single line of type; Style E, providing a double line; and Style F, a solid roll die combining permanent markings with interchangeable type and type segments.

T-9-29



Precision Die Filer

A Precision Die Filer, recently developed by DoALL Company, 254 N. Laurel Ave., Des Plaines, Ill., and manufactured for them by All American Tool & Mfg. Co., Chicago, has infinitely variable stepless speeds from 170 to 470 strokes per minute.

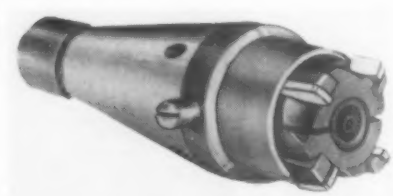
This range provides the correct speed for most uses, as filing, sawing, or honing in a wide range of materials. Speed changes are controlled by turning a handwheel, located at the front of the machine.

Files are available in 12 different shapes; also available are honing stones with either flat or radius cutting surfaces, and diamond hones for finishing carbides and metals harder than 65-C Rockwell.

A 2-power magnifier, equipped with twin lamps, provides illumination for close work and relieves eye strain. A universal-joint file clamp assures vertical file position, while the table tilts, by screw operation, with additional provision for precise 90° angles. Table is $10\frac{3}{8}$" square, stroke $1\frac{1}{2}$", and a spring-loaded upper tool clamp is completely adjustable for precision work. Chips are cleared by air jet. **T-9-30**

Replaceable Blade End Mills

The W. T. Howald Machine Works of 182 Sigourney Street, Brooklyn 31, N. Y., has added Carbide End Mills with Replaceable Blades to their line of carbide milling cutters.



Especially designed for production milling, these end mills are $1\frac{1}{2}$ in., 2 in. and 3 in. diameter and are furnished with No. 40 NMTB, Weldon, or B & S No. 9 shanks. The replaceable carbide tipped blades are made of standard square stock without serrations, grooves or other limiting elements. **T-9-31**

Hydraulic Press

A hydraulic press, recently added to its line of paper converting machinery by the Mercury Engineering Corporation, 2100 N. Farwell Ave., Milwaukee, Wis., and known as the Mercury Series H Hydraulic Press, has been developed as an improved method of die cutting and embossing paper products. However, uses may be found in other fields including textiles, leather, sheet metal, veneer and plastics.

A feature of this press is the traveling lower platen which moves vertically under hydraulic pressure. The upper platen carries the dies in fixed position and is provided with either air or spring knockouts to facilitate unloading. Of all welded, modern heavy duty construction, economy of space is effected by its self contained hydraulic unit, totally enclosed in the base. For ease of operation all controls are panel mounted.

The press is said to be characterized by versatility and ease of operation. The Model HD-25 machine, for example, has a 20" x 24" upper and lower platen and is rated at 25 tons with fifteen 1" strokes or three 5" strokes per minute. The stroke of the press can be varied from 0-5" by a simple hand control at the front of the press.

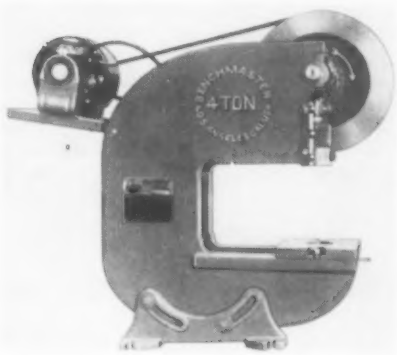
This press can be equipped with standard 3½" high cutting dies, ruled dies, or special tooling as required. Mounting pads on the machine base provide for feed and delivery tables, brackets or special fixtures which may be employed in the operation of the press. **T-9-32**

Tip Cleaner Device

A Tip Drill Kit for welding torches, by the J. M. Ragle Industries, Kansas City, Mo., is approximately the size of an automatic pencil and is provided with a pocket clip.

The end is a tempered steel double-end chuck holding drill sizes 45-80. The handle holds 24 different size drills, and 12 assorted drills in even number sizes, 52-74 inclusive, are supplied with the kit. **T-9-33**

Deep-Throat Punch Press



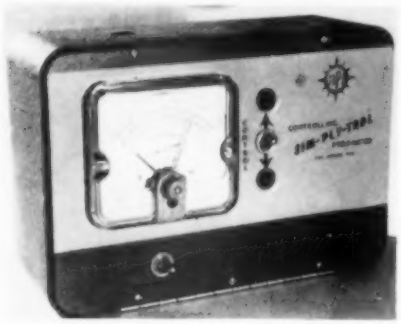
Benchmaster Manufacturing Company, Los Angeles, Cal., announces an improved deep-throat Press, of 4-ton capacity, in which the throat depth has been increased to permit punching to center of a 17½ in. circle.

Frame size and weight have been increased, and the press—which is powered by a 1/3 H.P. Motor—may be used with or without the 6 x 8 x 1 in. bolster plate. 1 in. or 1½ in. stroke is optional, with 2 in. stroke available on special order. **T-9-34**

See page 56 for handy Tools of Today coupon.

Simplytrol Pyrometers

A thermocouple type control for furnaces, ovens and kilns, by Assembly Products, Inc., Chagrin Falls, Ohio, operates on the micro-contact principle and is available in three types. The indicating pyrometers, with medium-size panel-type temperature indicator; the limiting pyrometers, which indicate temperature and have automatic shut-off; and the automatic controlling pyrometers which indicate and control by turning the heat on and off as needed to maintain a pre-set temperature.

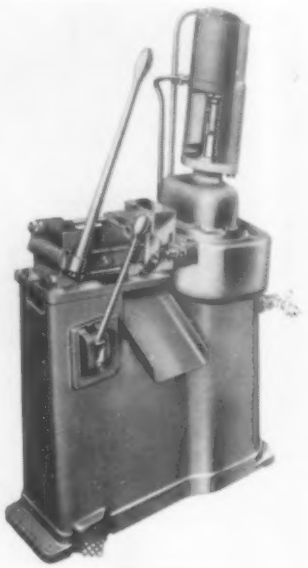


T-9-35

For Tool Engineers Service Bureau see page 56.

Small Die Casting Machine

A small air-operated Die Casting Machine, announced by the DCM Sales Corp., 315 Broadway, New York 7, N. Y., is designed for quick, economical casting of small parts in zinc alloy and utilizes low-cost, single-cavity dies operating at high speed. It is said to maintain a production rate of 20,000 shots per week.

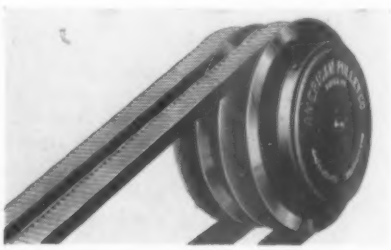


Features claimed by the maker include optional hand and foot controls and an air system with pilot and ram valves integral. The machine carriage is undercut for downpulls and ejecting large castings, and the base plate is adjustable to allow the use of die blocks of any required thickness.

The pot uses hydraulic suction to fill the cylinder, while a porthole at the base of the pot allows metal in it to be used before refilling becomes necessary.

T-9-36

Adjustable Sheave



A sheave said to provide permanent adjustability and to prevent frozen adjusting mechanisms is announced by the American Pulley Company, 4200 Wissahickon Ave., Philadelphia 29, Pa.

Sheave flanges are bonded to a rubber-lagged hub and this construction is said to eliminate "freezing" by acting as an insulation cushion between the two components. This construction also provides quietness; in addition, stainless steel screws and enclosed gears provide non-sticking and non-corrosive adjustment for the mechanism. T-9-37

Larger Vulcanaire

The Vulcan Tool Company, Dayton, Ohio announces a larger Vulcanaire—series 20,000—as a companion to the 65,000 RPM, Series 10,000 Vulcanaire originally designed for jig grinding holes in hardened steel with diameters ranging from 1/16" to a maximum of 1-½". The later tool is designed for accurate jig grinding in the 1-½" to 4" diameter range.

The 20,000 Series unit is an air driven attachment which converts jig borers and other machine tools into precision jig grinders.

Both the smaller and larger models are equipped with the same interchangeable special adapters to fit into the chuck of any machine tool on which jig grinding operations are desired, and both use the same standard and interchangeable accessories consisting of a portable stand on which is mounted an air cleaner, regulator, gage and oiler, together with a complete dust collecting system. **T-9-38**

Stamp Type by Cunningham

A line of interchangeable steel type, identified as S-T-M Precision Type and announced by the M. E. Cunningham Company, 170 E. Carson St., Pittsburgh, Pa., is designed for stamping metals, leather, or hard rubber finished products, name plates, and also any product requiring high grade marking.

The type is available in condensed, medium, and extended Gothic characters, in sizes ranging from 1/32" to ½", in light, medium or bold face styles. The same range of character sizes, widths and type faces are furnished in reverse style for stamping rubber, bakelite, or plastic molds. Full font sets and assorted quantities are also available. **T-9-39**

Rust Inhibiting Wax

A water-emulsion wax has been developed by S. C. Johnson & Son, Inc., Racine, Wis., for use as a rust-inhibiting coating for metals. Marketed as Johnson's Rust-Inhibiting Wax No. 1568, it is applied by conventional dipping, spraying, wiping or flow-coating and forms a dry wax plating on the metal part that checks corrosion.

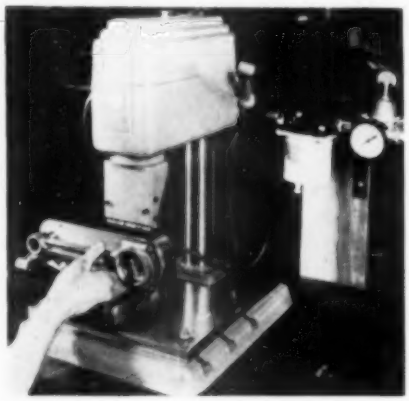
Currently used as a corrosion inhibitor on black-oxidized, phosphated and untreated metal surfaces, and on painted and plated parts as a guard against marring, it is said to be non-flammable and non-toxic, and to give coverage of between 2500 and 3000 sq. ft. per gallon.

Also, by S. C. Johnson, is a liquid wax—LW No. 20—for use as a lubricant for impact extrusion. This wax is applied to the slugs, before extrusion, by dipping or tumbling, and provides a dry finish said to remain in place, without dissipation, under the high heat generated by impact extrusion. **T-9-40**

Heavy-Duty Air Hose

A heavy-duty Air Hose, by Raybestos-Manhattan, Inc., Passaic, N. J., has been developed for rugged service encountered in quarries, mines and severe industrial uses. It is available in two sizes—¾ in. and 1 in. inside diameters and is designed for working pressures of 350 and 300 lbs. **T-9-41**

Automatic Marking Machine



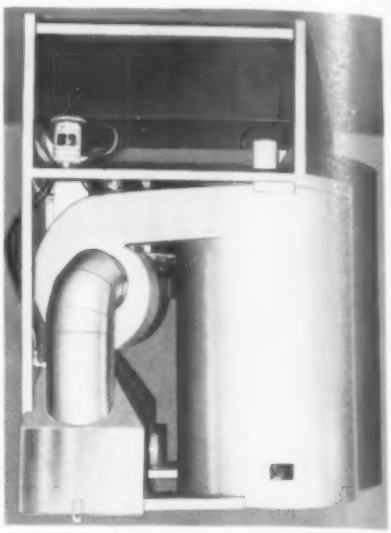
An Automatic Marking Machine—the "Automark," by Cadillac Stamp Co., 2138 Riopelle, Detroit 7, Mich., is designed for fast, low-cost marking on ferrous and non-ferrous materials.

The tool is further adapted to burning brand applications and gold and color-leaf marking, on a production basis, on wood, plastics, bakelite and leather and may further be used for light forming and piercing operations.

The tool operates pneumatically on standard air pressures and it is claimed that as many as 4000 parts may be stamped per hour. Range is 8 in. on square parts, with provision for curved surfaces, and impressions range from 0.0005 in. to 1/64th or more. **T-9-42**

Dust Separator

A second and improved unit of its line of industrial air cleaning equipment is announced by Industrial Electroplating Co., Inc., 219 West Vermont St., Indianapolis 4, Ind.



This Niehaus Dust Separator, which is a completely self-contained unit, employs water action to remove dust and grit from the air. Foreign particles are precipitated into a portable tank which may be periodically cleaned, and clean air is discharged from the top of the unit without appreciable loss of heat. **T-9-43**

Electric Box Furnace

Accurately controlled temperatures in the 300-2000° F range are said to be available in the Model VK-6 Cooley Electric Box Furnace, announced by Cooley Electric Mfg. Co., 38 S. Shelby St., Indianapolis, Ind.

This broad range adapts the furnace not only for hardening and other high-temperature work, but also for such low-temperature work as tempering and drawing. Chamber size is 8 x 6 x 14 in., and the furnace is supplied with selective power modifier and vertical lift door. **T-9-44**

HANNIFIN

Time-saving PRODUCTION TOOLS!

By doing in seconds work that would ordinarily take minutes, Hannifin "Hy-Power" Hydraulic Riveters pay for themselves! If you have a production problem, you can depend on Hannifin to help you increase output, cut costs, AND DO A BETTER JOB! The Hannifin *noiseless* "hydraulic squeeze" action can't be beat for turning out a perfect rivet every time, using either cold or hot rivets. Hannifin "Hy-Power" units come to you complete with automatic hydraulic pressure generator — READY TO GO TO WORK. Ask for recommendations.

HYDRAULIC *Hy-Power* RIVETERS

SPEED and POWER

You have speed and power "under your thumb" when you're equipped with Hannifin "Hy-Power" units. Time for automatic operating cycle ranges from 1½ to 3 seconds for standard riveters. Capacities up to 100 tons.

Many Different Models!

Hannifin builds hydraulic riveters for assembly operations on a wide variety of work: automobile and truck frames, structural steel, railroad car underframes and bodies, steel floor gratings, construction machinery beds and frames, automobile brake drum housings, ring gear assemblies. Specially designed yokes can be supplied for handling "hard-to-get-at" work. Reach up to 6 feet or more.

Hannifin "Hy-Power" units are also available for high speed punching, pressing, crimping, and shearing operations. Ask for a copy of Bulletin No. 53-J

Nationwide Sales and Service

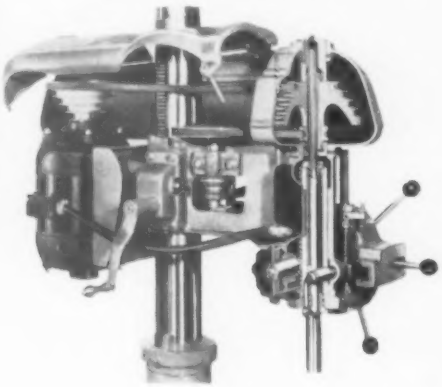
HANNIFIN CORPORATION

1101 So. Kilbourn Ave., Chicago 24, Ill.

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

FOR EXAMPLE

Model D-1101X Power Feed. Price: less motor and column **$216.00**
D-1100X Hand Feed. **$135.00***



HARLEY-DAVIDSON PERFORMS

110 SEPARATE OPERATIONS

WITH WALKER-TURNER 20" DRILL HEADS

Walker-Turner Light Machine Tools solve a dual problem for the Harley-Davidson Motor Co., Milwaukee, Wisconsin, in the production of their new lightweight model motorcycle. They fill the need for *standard* machine tools capable of handling approximately 110 *separate* drilling, tapping and spot-facing operations, and *eliminate the necessity for replacing expensive, special machines when models change.*

In set-ups devised by Harley-Davidson engineers, over 100 Walker-Turner Drill Heads machine motor, brake plate and crank-case assemblies. The equipment drills holes ranging from ⅛" to 1" in diameter at spindle speeds from 260 to 2600 r.p.m. When necessary, accuracy to .001" is attained. Both high-speed steel and carbide tools are employed.

Here again, Walker-Turner Light Machine Tools demonstrate their flexibility. Compact and rugged, Walker-Turner Light Machine Tools work *all* materials from wood and plastics through tool steel . . . set new high production records . . . give long, trouble-free service.

For complete catalog, write to Walker-Turner Division, Kearney & Trecker Corporation, Plainfield, New Jersey.

Photo, upper left: **Progressive machining stages at Harley-Davidson: multiple drilling, tapping and spot facing done entirely on set-ups of Walker-Turner 20" Drill Presses.**

Photo, lower left: **Facing internal hubs of cast aluminum. Facing tools are mounted in standard Walker-Turner 20" Drill Presses.**

Photo, upper right: **20" Power Feed Drill Press Head, Model D-1101X, Hand Feed Model D-1100X. 4 ball bearings, 6" spindle travel. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor. Capacity 1" in cast iron, ¾" in steel. . . . . Slo-speed motor optional.**

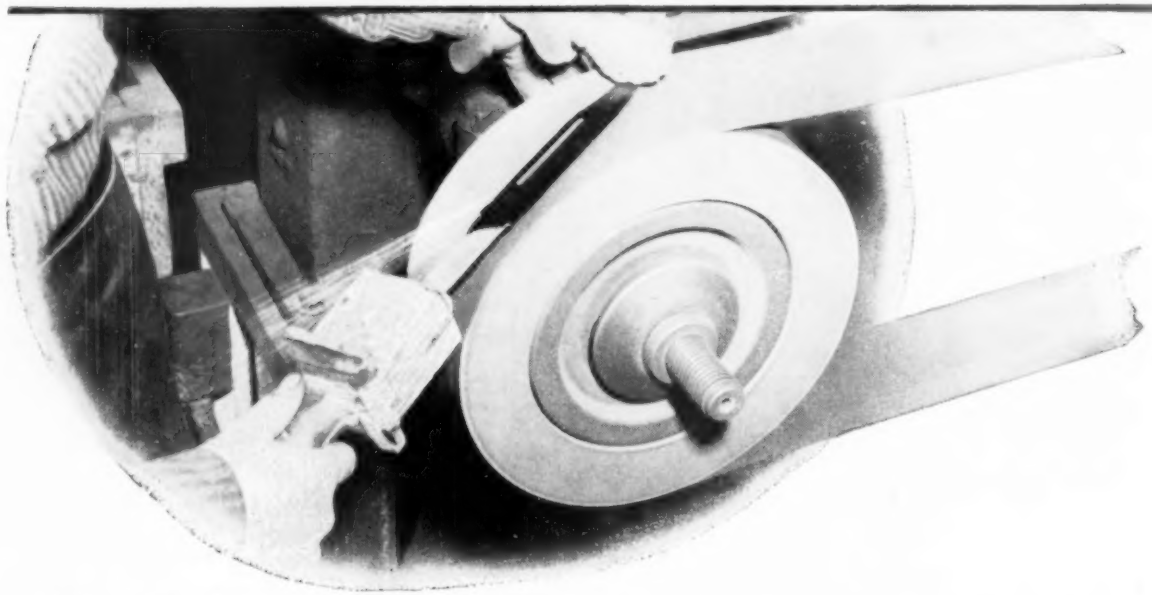
walker-Turner MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS
RADIAL SAWS • BAND SAWS—FOR WOOD OR METAL
RADIAL METAL CUT-OFF MACHINES • MOTORS

4205

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS

THE CASE OF THE DOUBTFUL CONTRACT



Profitless grinding proposal becomes valuable business through use of

METALITE* BELTS

Even with his sharpest pencil this cutlery manufacturer could not figure any profit to him, using set-up wheels, in a proposed contract including rough and finish grinding sheath knives. Then he considered the belt backstand method — and the proposition immediately became good business.

Using a Hammond Model 3 backstand with Behr-Manning hard-density contact wheels, 12" x 4" x 1¼", and Durabonded Metalite Cloth Belts, grit #60-X and #100-X, he realized the following production performance: First, production volume 60% above "profit-level" estimate; second, production costs 45% below "profit-level" estimate.

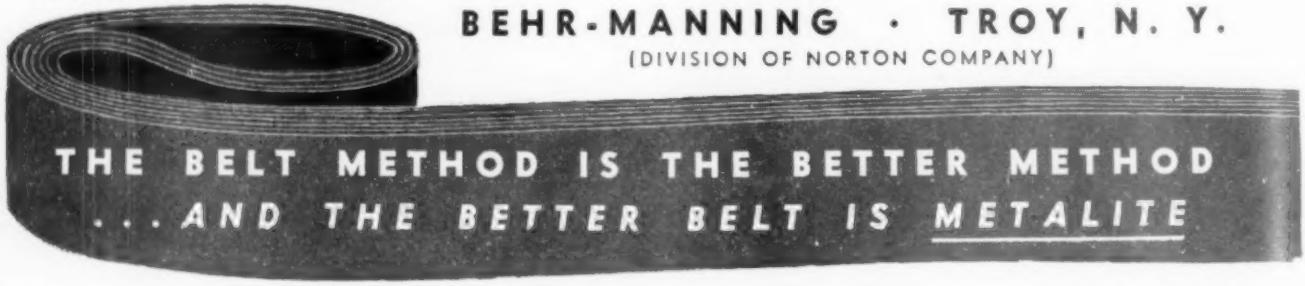
In any off-hand grinding job, it pays to check on the advantages of the belt-backstand method with Metalite belts. You can do this right in your own plant with our free demonstration service. No obligation — simply write, phone or wire us.

GET THE COMPLETE SERIES

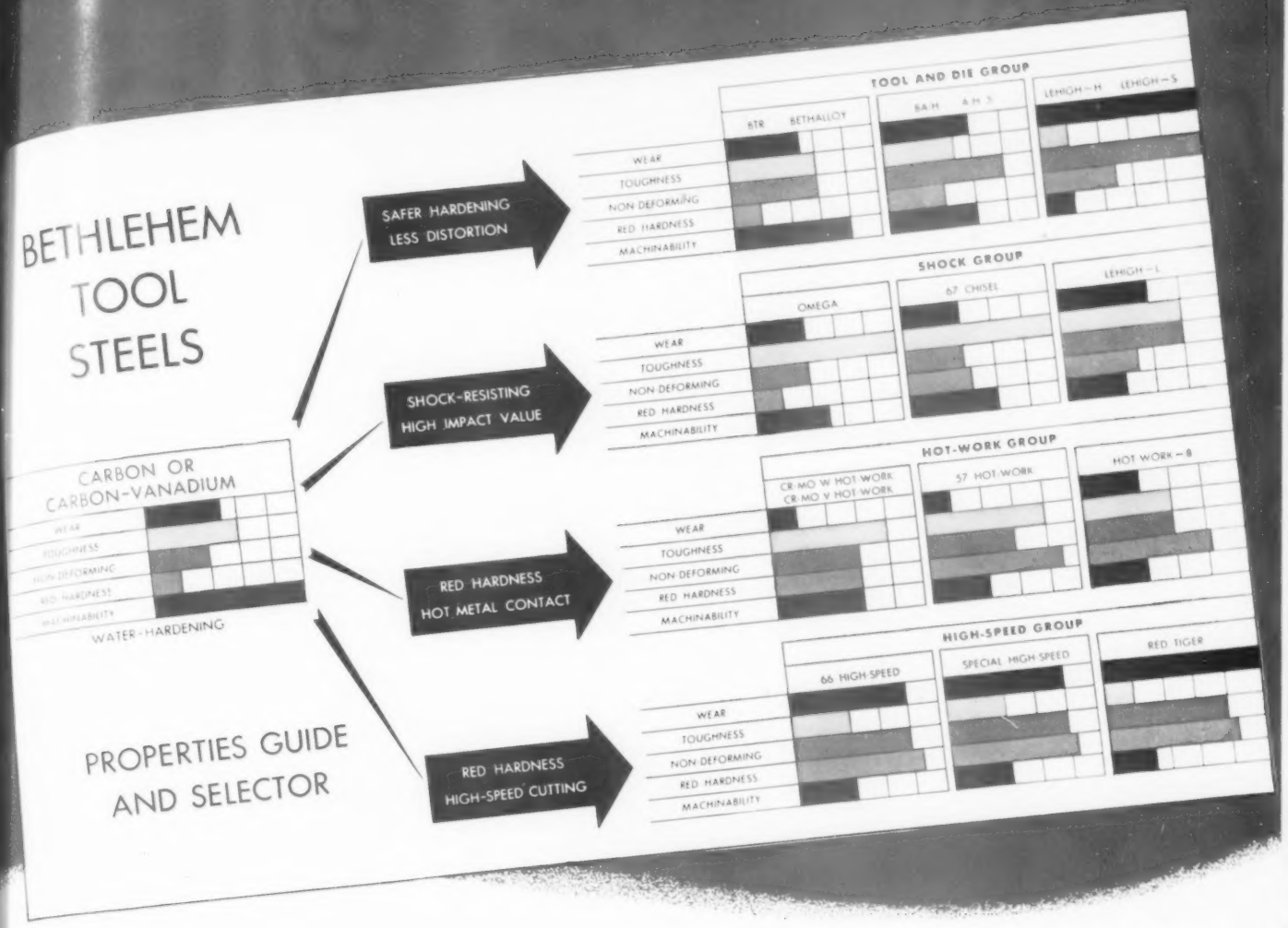
Our booklet "Production Talks — Backstands" gives you a whole series of similar case histories with convincing facts and figures. Write for your copy today.

* *Reg. U. S. Pat. Off.*

BEHR-MANNING · TROY, N. Y.
(DIVISION OF NORTON COMPANY)



THE BELT METHOD IS THE BETTER METHOD
...AND THE BETTER BELT IS METALITE



PROPERTIES GUIDE and SELECTOR OF Bethlehem Tool Steels

The properties guide and selector shown above was originally prepared to assist our own sales organization . . . and they have found it so useful that we present it here.

The length of each bar indicates the high or low relative values of the characteristics of each steel. For example, the long "toughness" bar for Omega shows excellent toughness, while the very short "red-hardness" bar indicates relatively poor red-hardness. The grades of tool steel are arranged in the order of increasing wear-resistance from left to right in each group.

If you'd like to have one of these charts, printed in six colors, together with condensed information on the various grades of Bethlehem Tool Steels, we'll be glad to send it to you promptly. Address our Publications Department, Bethlehem, Pa.

There are Bethlehem tool steels for every job. Deliveries are prompt, and our metallurgical staff is always ready to work with you.

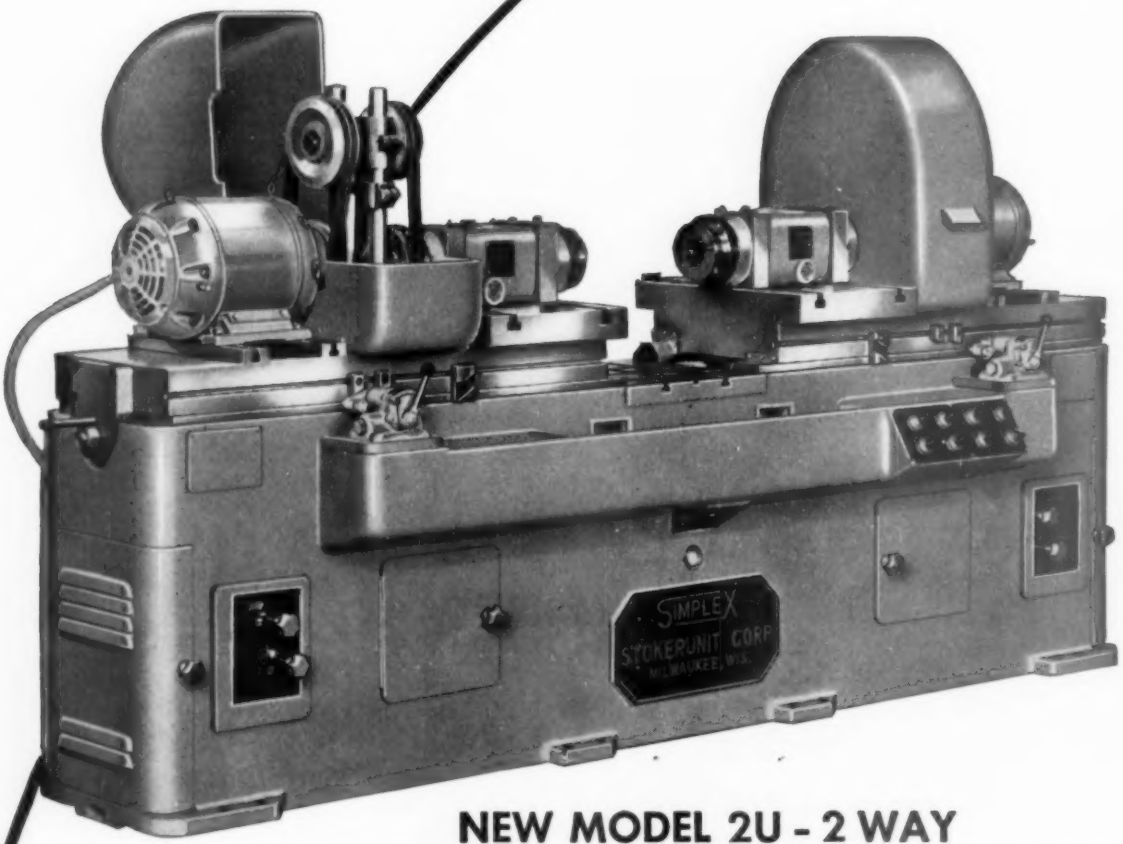
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

SIMPLEX

A New Concept of Precision Boring Machine Design



NEW MODEL 2U - 2 WAY

- NEW SEALED — LUBRICATION PRECISION BORING HEADS
- NEW ONE PIECE BED CONSTRUCTION
- NEW INCREASED CAPACITY PLATEN DESIGN

PRECISION BORING MACHINES

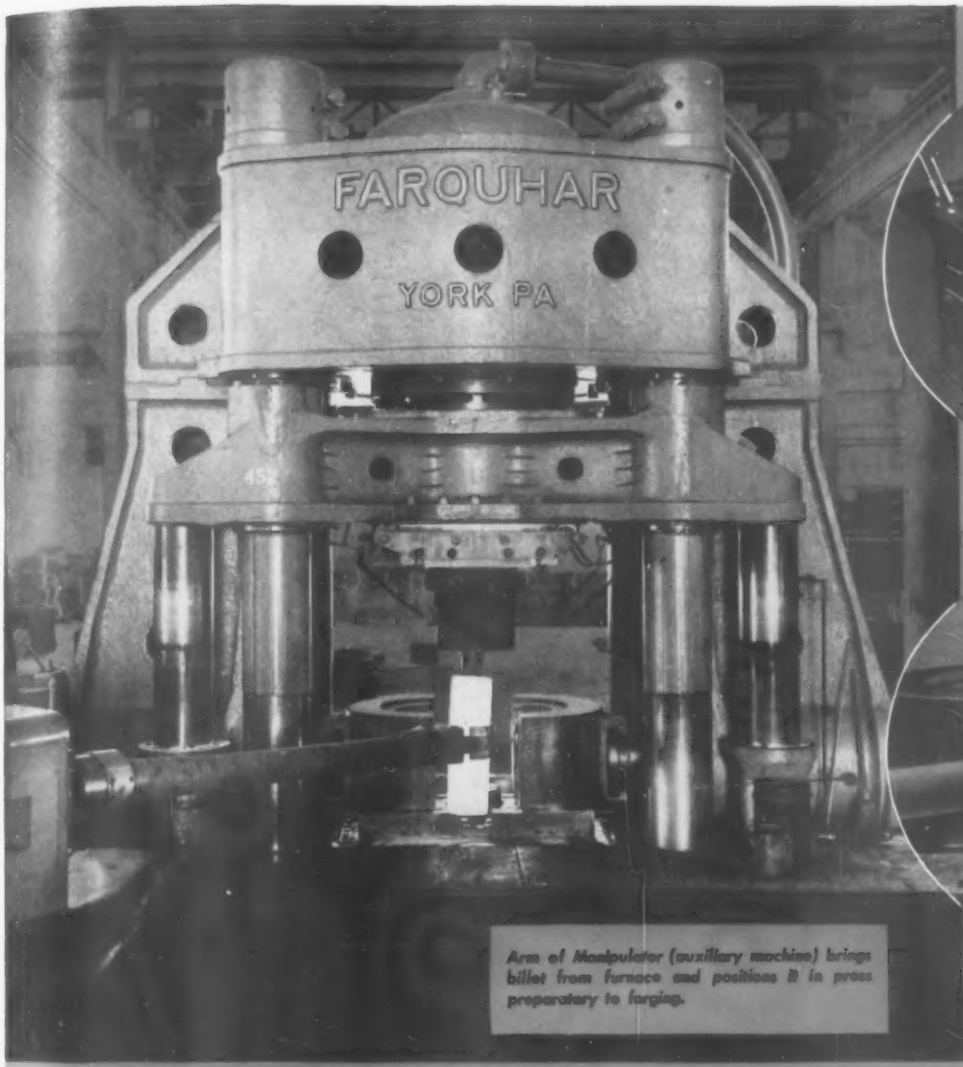
SIMPLEX MACHINE TOOLS DIVISION

STOKERUNIT CORPORATION

4528 West Mitchell Street

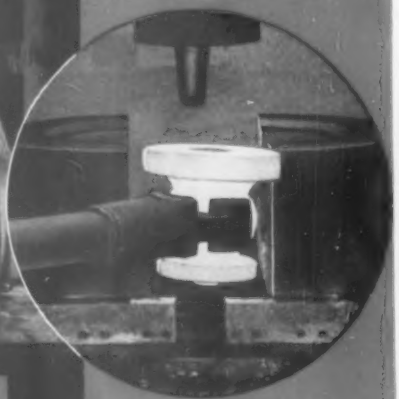
MILWAUKEE, WISCONSIN

Precision Boring Machines, Planer Type Milling Machines, Special Machine Tools



Arm of Manipulator (auxiliary machine) brings billet from furnace and positions it in press preparatory to forging.

Above: Remote Farquhar control panel which is handled by one operator for controlling all press operations.



Above: Manipulator arm removing finished forging from press. One operator handles manipulator, another helps guide the positioning of billet.

FARQUHAR HYDRAULIC PRESS

turns out better forgings *faster* for Cameron Iron Works

THIS GIANT 5000-ton Farquhar Hydraulic Press has a big job to do at the Cameron Iron Works, of Houston, Texas —*and it's doing it!*

Cameron needed faster and better production of tubing head spools which are used for well completions in the oil industry. These parts had formerly been produced from steel castings. By using the built-to-specification Farquhar Press to turn out 800-lb. forgings of the spools instead (see illustrations), Cameron speeded up production, saved time and labor.

Advantages of forgings by the Farquhar Press over the castings are: *Cheaper to produce . . . Forgings free from porosity . . . Uniform in physical properties . . . Controlled in grain structure.* And—the Farquhar Press operated at a minimum of maintenance cost. Cameron gets higher quality at lower costs for this operation—still can convert the Press for other production jobs in the future.

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in heavy production. Farquhar Presses are built-for-the-job . . . Presses that assure *faster production* due to rapid advance and return of the ram . . . *greater accuracy* because of the extra guides on moving platen . . . *easy, smooth operation* with finger-tip controls . . . *longer die life* due to positive control of speed and pressure on the die.

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send For Free Catalog showing the wide range of Hydraulic Presses Farquhar builds in all sizes and capacities for all types of industry. Your FREE copy is waiting. Write to: A. B. Farquhar Co., *Hydraulic Press Division*, 1519 Duke St., York, Pa.

Farquhar
HYDRAULIC PRESSES
for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Joggling • Forging • and other Metal-working Operations

TOPS in TAPPING

Jarvis TECNI-TAPS

For maximum performance under tapping conditions prevailing in your shop, make your next order read "Jarvis TECNI-TAPS" . . . custom finished to meet your demands. TECNI-TAPS cut more threads with less power, require minimum sharpening and provide greater dependability on the job. There is a Jarvis representative in your territory Try "Jarvis TECNI-TAPS" and see, feel and figure the difference.

WRITE FOR BULLETIN JD-101

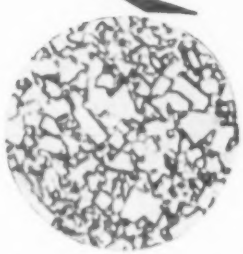
Jarvis POWER TOOLS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

Rotary Files • Flexible Shaft Machines • Taps and Dies
Tapping Attachments • Quick Change Collets and Chucks

Better Performance ... because of *Better Structure**

It takes a hard, strong, sound tool material to remove 4,500 cubic inches of metal from five of these semi-steel cast-iron cylinder liners before regrinding—and then to repeat the performance after each resharpening, over the entire life of the tool.



* Consistent soundness and uniformity of structure characterize all Kennametal compositions, as illustrated in the micrograph above (1500 times enlargement). Note absence of large grains, and virtual freedom from porosity.

All Kennametal compositions are much harder than the hardest tool steel, and the uniformity of hardness and strength of each grade comes from a consistently sound physical structure which is produced by distinctive processing, and precise, scientific methods of control.

The proof of the pudding is in the eating—service results prove that a carbide which gives superior service is that having uniform grain structure, and therefore consistently maintained hardness, strength, and wear-resistance. That's Kennametal.

Equally important in cutting machining costs are Kennametal developments in mechanically-held tooling which further extend the profitable use and low-cost maintenance of carbide tooling.

Kennametal tooling is completely-proved—can save money on 90% of your routine and unusual jobs. Ask our district engineer to demonstrate.

KENNAMETAL Inc.
LATROBE, PA.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION

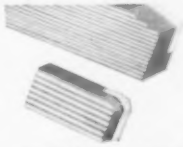

STYLE BL


STYLE C


STYLE FL

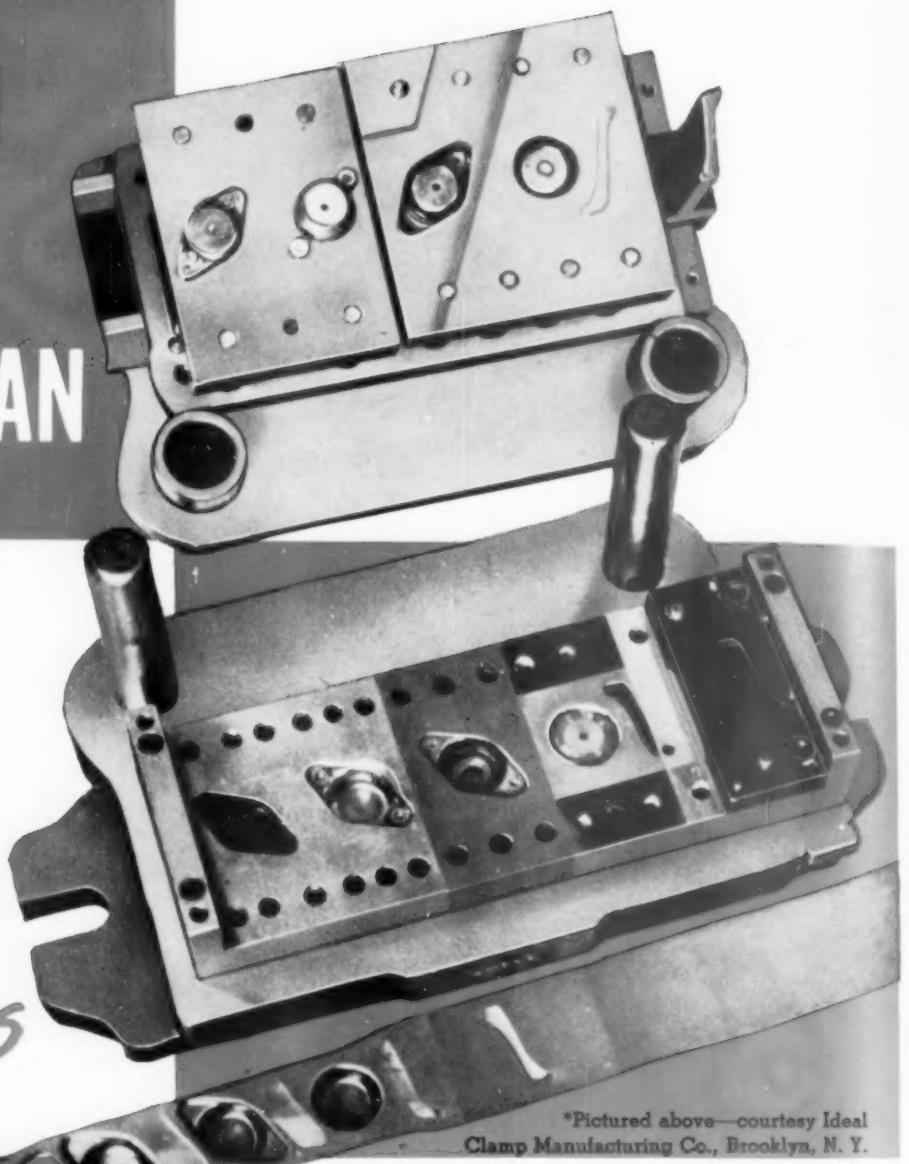

STYLE GL


KENNAMATIC STYLE 12SK

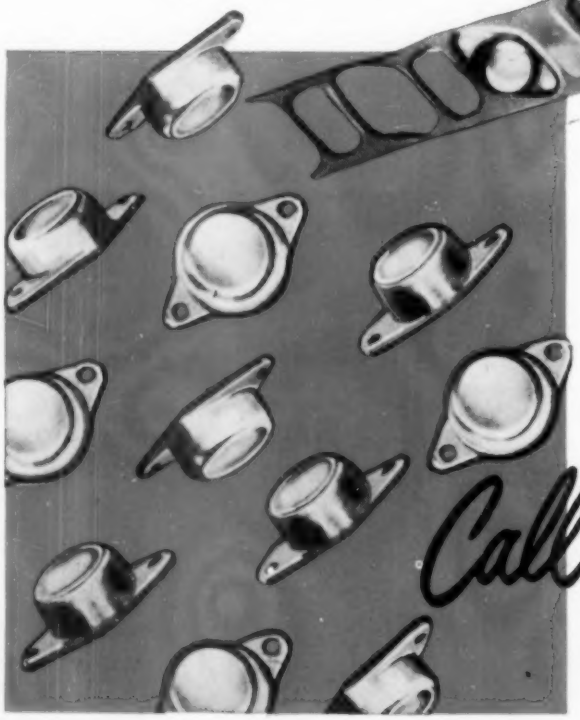

SERRATED MILLING CUTTER BLADES

Depend on CROMOVAN

when production schedules say "millions



*Pictured above—courtesy Ideal Clamp Manufacturing Co., Brooklyn, N. Y.



PERFORMANCE RECORD

Material worked . . . . . .031 cold rolled steel
Total pieces produced . . . up to 50 million
No. of pieces between grinds 500,000
Die* . . . . Cromovan steel, 4-station notching, piercing, slitting, forming die.

Cromovan's outstanding features and long life are assurances of uniformly fine products and low operating costs.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

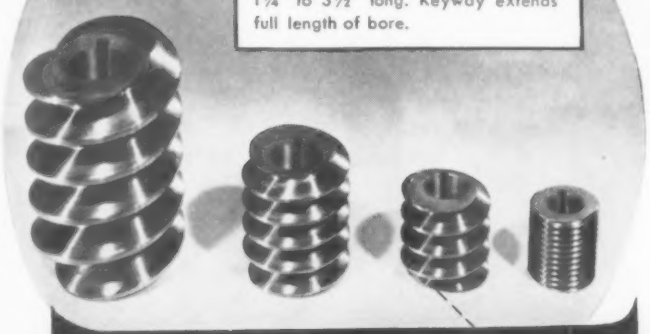
McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND
BUFFALO • DAYTON • DETROIT • CHICAGO • LOS ANGELES
IN CANADA—CHAPAT ENGINEERING & SALES, LTD.

NEW Sunnen Honing Process for bores with keyways

INCREASED PRODUCTION 10 TIMES on Internal Diameters of Worm Gears

. . . at Master Electric Co., Dayton, Ohio

Worm gears are made of SAE-1315 Steel, carburized and hardened to Rockwell "C" 62 to 70, sizes range from ½" to 1⅝" in diameter and from 1¼" to 3½" long. Keyway extends full length of bore.



Here Are the Facts—

These worm gears—with keyway bores — are Sunnen-honed to remove heat-treat distortion. Production rate is 150 parts per hour — production rate by former method, 12 to 15 parts per hour.

In addition to this tremendous saving in time, a more accurate fit is produced. Machine operators are pleased because Sunnen wet honing eliminates handling of hot parts, makes the job easier, and permits faster, easier, more accurate gauging of these gears.

Sunnen Precision Honing Machines are Versatile

- ✔ **Handle Wide Range** — Hone diameters from .120" to 2.625". Open or blind holes and bores with keyways.
- ✔ **Hone All Metals, Ceramics, Glass**—Steel, cast iron, bronze, brass and aluminum.
- ✔ **Produce Holes Accurate Within .0001"**—Sunnen-honing corrects out-of-roundness and distortion. Produces straight, round holes.
- ✔ **Produce Any Micro-inch Finish Required**—No high spots, chatter marks or other surface imperfections.

Write for information or, on request, a Sunnen engineer will be glad to show you the advantages of using Sunnen Honing in your plant.

Sunnen Precision Honing Machine in use at Master Electric Company.

SUNNEN

SUNNEN PRODUCTS COMPANY
7945 Manchester Ave., St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

SUNNEN PRECISION HONING

274

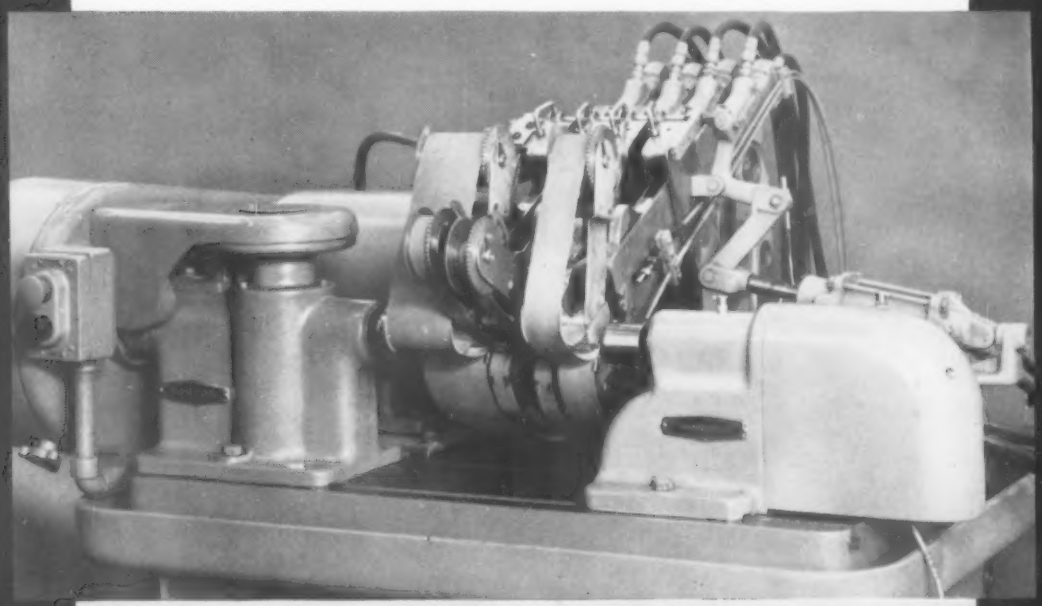
. . . on the NORTON #12 SIMPLEX SURFACE FINISHING MACHINE

THE Norton #12 Simplex combines the highly desirable features of simplified, trouble-free design, and the ability to do an outstanding job. Here are some pertinent facts about this new NORTON machine:

- **Highly compact — very little floor space required.**
- **Handles work up to 12" in length.**
- **Pneumatically operated.**
- **A control valve automatically governs the loading and unloading cycle.**
- **Finishing cycle controlled by electric timer.**
- **Operation is by a single control lever, which the attendant merely turns.**
- **Uses a specially treated abrasive paper or cloth as the finishing medium.**
- **No coolant system required.**

Catalog #217-1 gives further details, write for a copy.

M-558



Closeup showing NORTON #12 Simplex Surface Finishing Machine with arms in operating position on a compressor shaft.

NORTON COMPANY, WORCESTER 6, MASS. · New York · Chicago · Detroit · Cleveland · Hartford · Distributors in All Principal Cities

Woodworth Engineered Products

PRECISION GAGES

Woodworth manufactures a complete line of thread ring and thread plug as well as cylindrical plug and ring gages. Also produce special gages to customer blueprints.

PRECISION PARTS

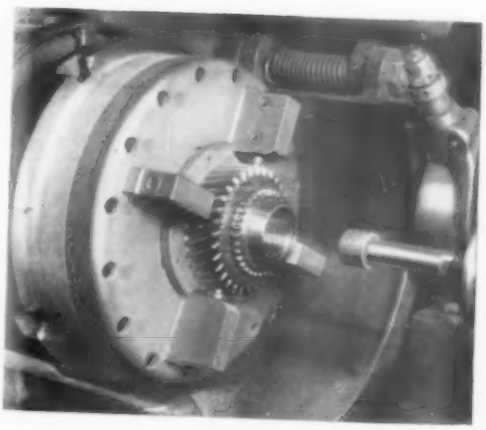
N. A. Woodworth engineering gives you plus value in precision parts. Production men with "know how" combined with well equipped plant are pace setters in aircraft engine and radar assembly fields.

CONE-LOK JIGS

Woodworth Cone-Lok Jigs are noted for their mechanical simplicity and "life-time" construction.

DIAPHRAGM CHUCKS

Chucks engineered and built by Woodworth guarantees the ultimate in precision gear chucking.



ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN

COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

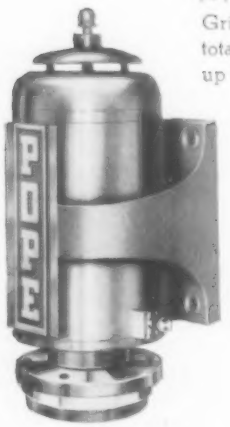
POPE

GRINDER SPINDLES AT A GLANCE

P-327 Pope Sealed Package Spindle for 6" x 18" Surface Grinders, with a full 1 HP, 3450 RPM totally enclosed motor; for use with grinding wheels up to 8" O. D., ¾" face, 1¼" hole.

P-1004 Pope Direct Motorized Tool Grinder Spindle with 1 HP, 3450 RPM totally enclosed motor; for grinding wheels up to 8" O. D., ¾" face, 1¼" hole.

P-2463 Pope Heavy Duty Vee Belt Driven Cartridge Type Spindle in mounting bracket, for grinding wheels up to 4" O. D. at 6000 RPM, 2" face with 1" hole.



P-2500 Pope Heavy Duty Motorized Spindles in a variety of sizes from ¾ HP to 20 HP and from 900 to 3600 RPM.

P-666 Pope Heavy Duty Vee Belt Driven Grinding Machine Wheel Head Spindle, for grinding wheels up to 28" O. D., 1½" face, 8" hole at 750 RPM. Maximum speed 4000 RPM.

Here is a representative showing of POPE Precision Grinding Spindles. Others are available in a great variety of sizes and styles. Each assures:

1. Constant Production of Uniformly Good Finished Surfaces.
2. Cool Operation At High Speeds Over Long Periods.
3. Sealed Lubrication Performance — no oiling or greasing, nothing to renew, replace or adjust throughout the entire life of the bearings.

NO. 52

POPE

TRADE MARK REG. U.S. PAT. OFF.

POPE MACHINERY CORPORATION

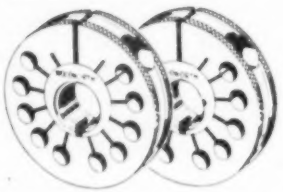
ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

Woodworth Engineered Products

PRECISION GAGES



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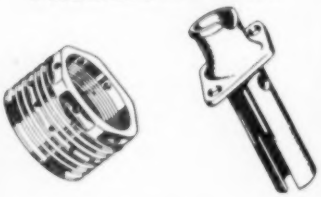
PRECISION PARTS



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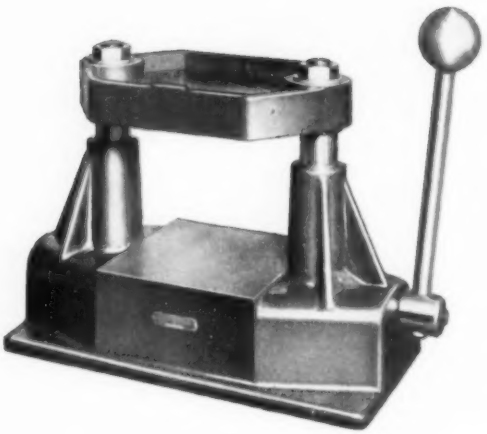

CONE-LOK JIGS

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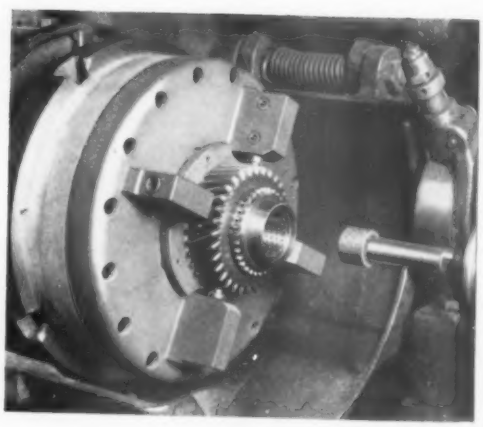
DIAPHRAGM CHUCKS

Chucks engineered and built by Woodworth guarantees the ultimate in precision gear chucking.



ACCURACY YOU CAN TRUST

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COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

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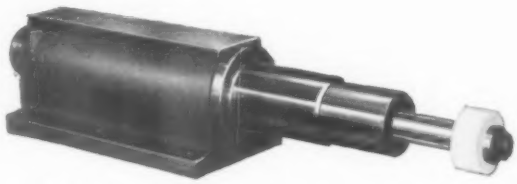

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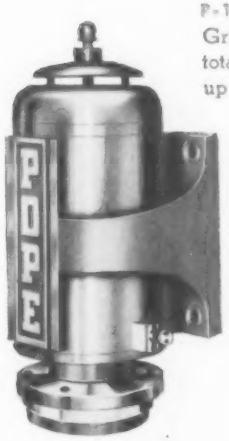

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NO. 52

POPE

TRADE MARK REG. U.S. PAT. OFF.

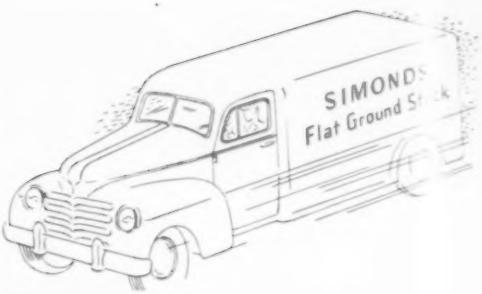
POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

Get Delivery Today...



Save Time and Money...

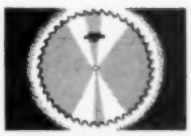
Make your own Dies, Jigs and Parts

HERE'S A COST-CUTTING *NATURAL* that you can cash in on *without any delay.* Get Simonds "Red Streak" Oil Hardening Flat Ground Stock from your Industrial Supply Distributor. He has it in all standard sizes . . . uniformly annealed for easy machining and proper hardening (with directions on the individual envelope) . . . cut to 18" length . . . accurately ground to standard thicknesses and widths . . . with square edges . . . and with smooth surfaces for accurate layout work.

No grinding to size. Just cut it . . . with Simonds Metal-Cutting Band Saws . . . to your own designs of punches, dies, gages, jigs, fixtures, templates, stamps, shims, small machine parts, and other items which you now have to order and wait for. Call your Distributor *today.*

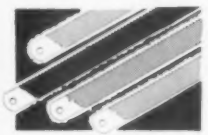
BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 West Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SIMONDS ALSO MAKES

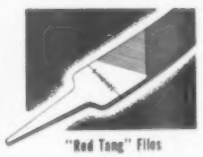


Circular Metal-Cutting Saws (Solid-Tooth, Inserted Tooth, Segmental)

Metal-Cutting Band Saws



"Red End" Hacksaws



"Red Tang" Files

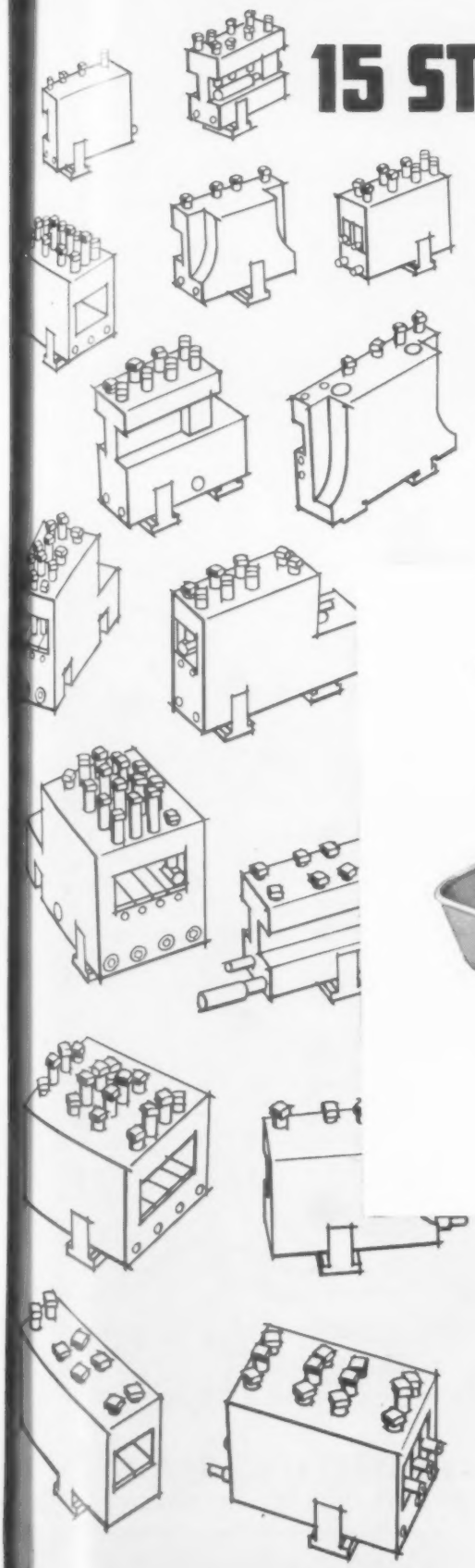
PLUS A WIDE LINE OF TOOLS FOR CUTTING WOOD, PAPER, PLASTICS

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry
Special Electric Furnace Steels
Grinding Wheels and Grains
Simonds Products for Canada

SIMONDS "RED STREAK" Oil Hardening FLAT GROUND STOCK

"When you use Simonds you stay in the Highlands . . . of *consistent* cutting efficiency"

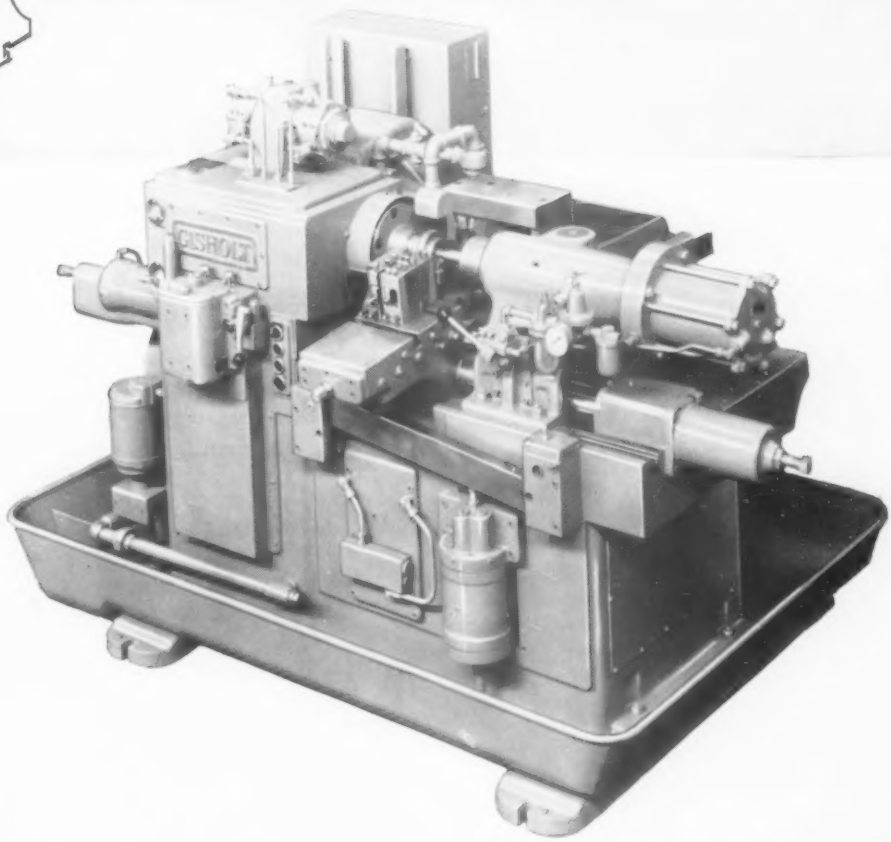
GISHOLT No.12 HYDRAULIC AUTOMATIC LATHE



15 STANDARD TOOL BLOCKS

cut down tooling costs.

They're handy for small lot work—available from stock.



GISHOLT MACHINE COMPANY

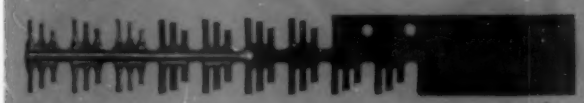
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

7,200 Pieces per hour

from 1 9/16" x .042" C.R.S. Coil Stock



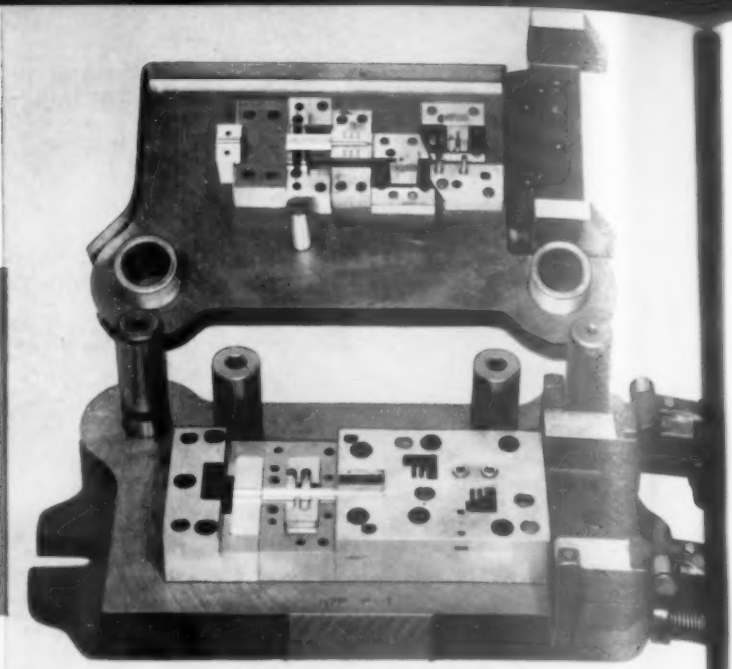


Photo courtesy of Federal Tool Corporation, Chicago

...using

DANLY *Precision* Die Set

Tolerance of .001" held on 10-station progressive die

Here's another example of how Danly Precision Die Sets maintain close tolerance punch and die relationship on high production work.

The part illustrated, a nut chopper cutter, is produced on a 10-station progressive die at a rate of 7,200 pieces per hour. An average of 100,000 pieces are obtained between grinds. Tolerance of .001" between stations is maintained.

To date the same original Danly Die Set has held the tolerance required for a total of 1,500,000 pieces, and under normal operating conditions, will continue to give many more hours of profitable service.

SEQUENCE OF OPERATIONS—The roll stock is fed automatically through the following sequence of operations: (1) Pierce and notch right edge, (2) pilot, (3) notch left edge, (4) rough form center, (5) finish form center, (6) idle, (7) twist, (8) idle, (9) idle, (10) cut off.

HELPFUL ENGINEERING SERVICE—For helpful engineering service on Die Sets of any size, standard or special, for any type of press operation, consult Danly without obligation.

save time { USE DANLY NATION-WIDE DIE SET ASSEMBLY SERVICE

Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

- **Chicago 50,** 2100 S. 52nd Ave.
- **Cleveland 14,** 1550 E. 33rd St.
- **Dayton 2,** 990 E. Monument Ave.
- **Detroit 16,** 1549 Temple Ave.
- **Grand Rapids,** 113 Michigan Ave., N.W.
- **Long Island City 1,** 47-28 37th St.
- **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
- **Milwaukee 2,** 111 E. Wisconsin Ave.
- **Philadelphia 44,** 18 W. Chelten Ave.
- **Rochester 4,** 16 Commercial St.

write for this *Free* bulletin

Illustrates how you may use Danly's special machining and welding service to save additional time and money.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

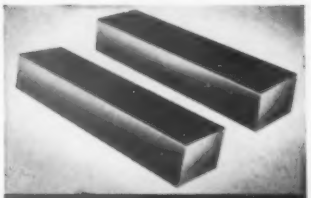
25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL ● MECHANICAL PRESSES AND PRESS EQUIPMENT

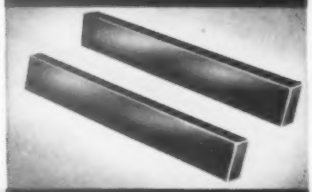
HAYNES STELLITE 98M2 TOOLS

Trade-Mark

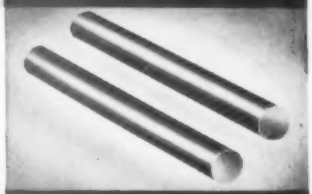
have ... red hardness
... increased edge strength
... toughness



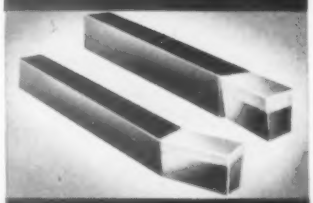
SQUARE TOOL BITS



RECTANGULAR TOOL BITS

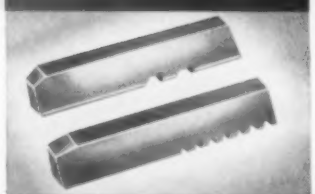


ROUND TOOL BITS



TIPPED TOOLS

TOOL TIPS



INSERT MILLING CUTTER BLADES

HAYNES Stellite 98M2 tools are especially suitable for faster production machining of ferrous and non-ferrous metals, plastics, and wood. In addition to the standard tools illustrated, special tools, made to your specifications can be promptly furnished.

98M2 alloy—composed of cobalt, chromium, and tungsten—is inherently hard. And since its hardness is not the result of heat treatment, tools made of this alloy have no "temper" to be affected by high temperatures. They cut efficiently even at red heat, and have a good balance of hardness, edge-strength and toughness. This unusual combination of properties makes possible heavy cuts and coarse feeds at high speeds. This high rate of stock removal assures a low cost per piece machined.

For a complete list of styles, sizes, and prices of stocked standards, write to the nearest district office for a copy of the booklet, "HAYNES Stellite Metal Cutting Tools" Form 5401.

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company

Unit of Union Carbide and Carbon Corporation

UCC

General Offices and Works, Kokomo, Indiana

Sales Offices: Chicago — Cleveland — Detroit — Houston — Los Angeles — New York — San Francisco — Tulsa

The registered trade-marks, "Haynes" and "Haynes Stellite" distinguish products of Haynes Stellite Company.

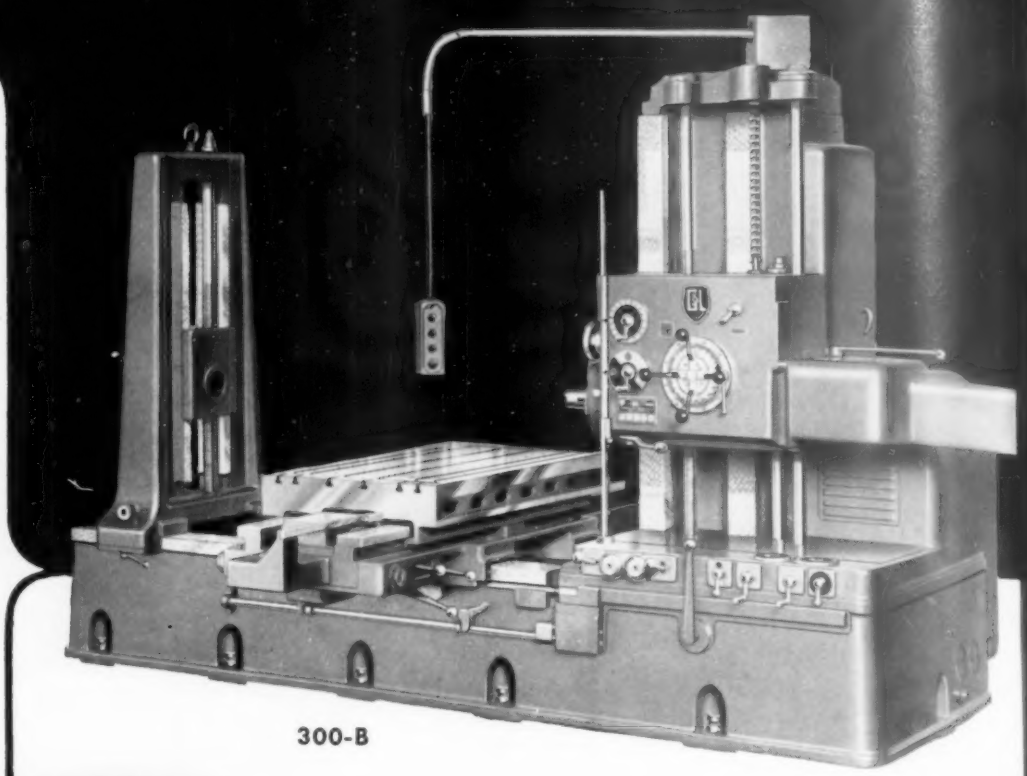
NEW

MEDIUM DUTY MACHINES FOR YOUR *HIGH SPEED* OPERATIONS

Of most recent design, the No. 300 Horizontal Boring, Drilling and Milling machine is made with either a built-in rotary or plain table. This machine is built for your high speed operations, and has the power and rigidity necessary to produce excellent finishes with great accuracy at high rates of speed and feed. A 10 HP AC motor drives the 3" spindle smoothly under the heaviest load.

Built-in scales and verniers give readings to .001" for headstock, table and saddle movements. A simple micrometer measuring attachment reading, with the use of standard measuring rods to .0001", may be provided if required.

G&L service engineers will gladly study the application of this machine, or any G&L, to your particular problem. Write for our six page bulletin describing the G&L 300-A, 300-B and 300-R.



300-B

300-R

SPINDLE DATA

Diameter	3.000"
Longitudinal Travel	24"
Number of Speeds	36
Speed Range (RPM)	22 to 1600
Number of Feeds	18
Feed Range (Inches per Rev.)	
Between 22 and 180 RPM	.002 to .125
Between 200 and 1600 RPM	.0012 to .062

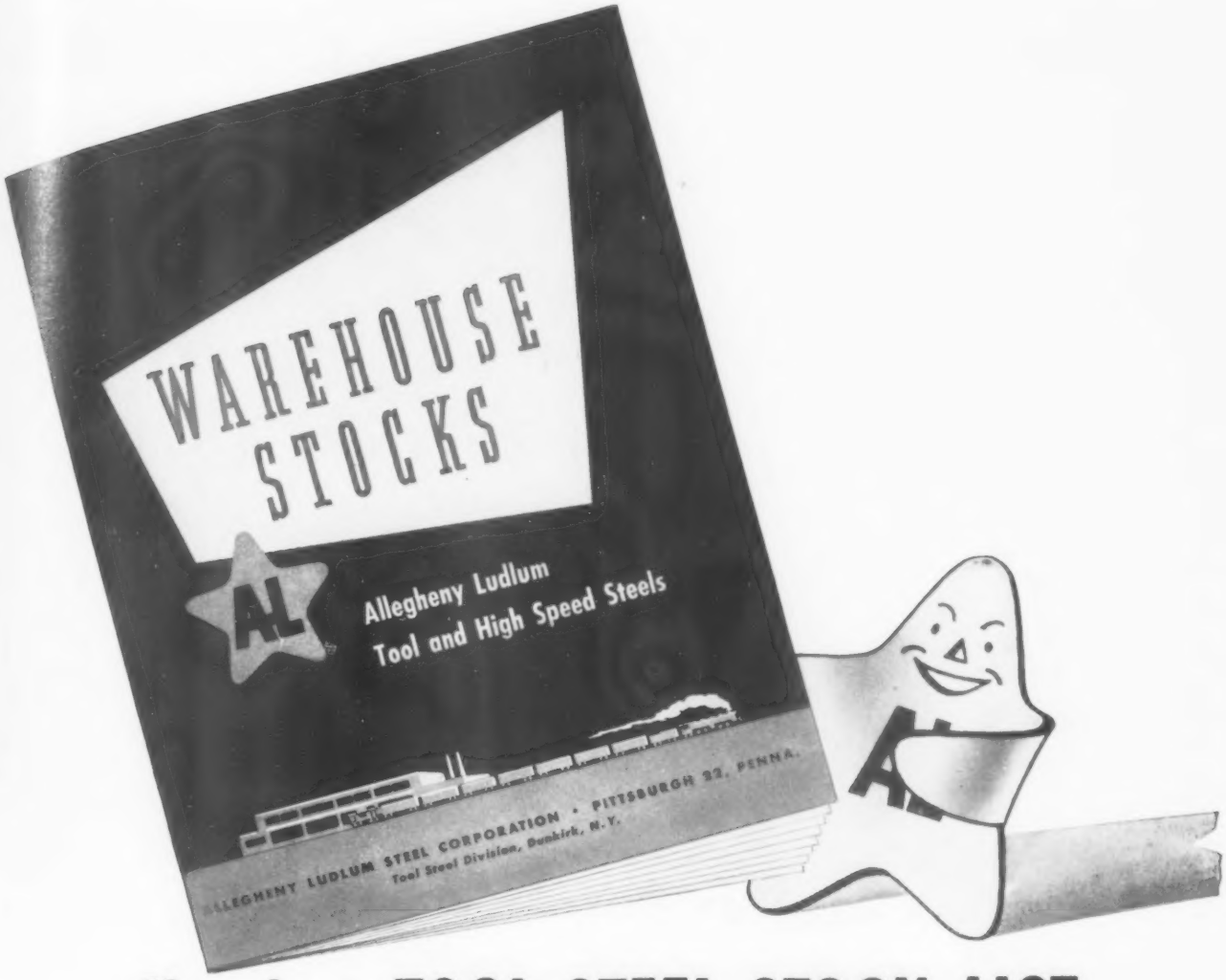
MACHINE DATA

	300-A	300-B	300-R
Working surface of Table	24"x42"	30"x48"	30"x36"
Cross Travel of Table	30"	36"	36"
Max. Saddle movement on bed with End Support in place	30"	36"	36"
Max. dist. face of Spindle Sleeve to End Support	60"	72"	72"
Headstock Travel on Column	30"	36"	33"
Number of Milling Feeds	23		
Range of Milling Feeds to Headstock, Table and Saddle in inches per minute	1/16 to 30		
Motor Recommended	10 HP - 1750 RPM (Dyn. Bal. .001" NEMA)		

G&L

GIDDINGS & LEWIS Machine Tool Company

FOND DU LAC, WISCONSIN, U.S.A.



Here's a TOOL STEEL STOCK LIST that's really *Clear, Concise* and *Dependable!*

There's an A-L Tool Steel to do each job *best*

The Allegheny Ludlum Tool Steel family includes 37 principal types, covering the high speed, hot work, shock resisting, cold die, and carbon and low alloy steel fields. Let us help you find the best answer to *any* problem that occurs in your production or use of cutting and forming tools.

ADDRESS DEPT. TE-68

This 72-page catalog lists the stocks of A-L High Speed and Tool Steels which are constantly maintained in each of 18 warehouses, located at convenient points from coast to coast. In compact, easy-to-follow style, the book gives a complete stock picture, nationwide, of the 15 most widely used types of these steels—each in a full range of standard shapes and sizes—and also includes data on stocks of drill rod, tool bits and Carmet carbide metal blanks and tools.

It may be that your requirements call for mill shipments. If so, you can rely on us to schedule material for you without delay. *But*—if you depend entirely or in part upon ordering High Speed and Tool Steels in smaller lots—and want to know where you can get them *quickly*—you'll find A-L's book of "Warehouse Stocks" mighty handy to have in your desk. • Write for your copy *today!*

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854 AL WAD 1781

First quality high speed steels

more malleable
before heat treatment

tougher
afterward

it's their nature—
and it comes from

Controlled
Melting
Formulas

RIGHT . . . right from the start! The fine, sound tool steel our customers depend upon from Vanadium-Alloys is quality-determined *before* each heat by our exclusive Controlled Melting Formulas. With forty-five years of experience in producing First Quality tool steels, we formulate precise blends of materials for each furnace charge according to our special knowledge. This is a *basic* step in achieving the easy-working, tough-hardening character of our steels, so well-known throughout industry.

• *Can we serve your requirements?*

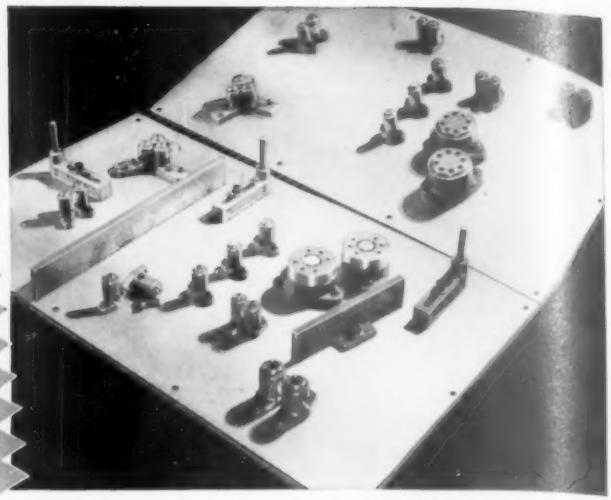
Vanadium-Alloys
STEEL COMPANY
COLONIAL STEEL DIVISION ANCHOR DRAWN STEEL CO.
LATROBE, PENNA.

Manufacturers of
FIRST QUALITY
TOOL and DIE STEELS
—exclusively

Nothing can be

WHAT COULD BE SIMPLER FOR HOLE PUNCHING THAN

THE WALES PATENTED AND EXCLUSIVE TEMPLATE MOUNTING METHOD*



A template setup of Wales type "CD" Hole Punching Units ready to be mounted in stamping press.

One Important Application is in Combination with WALES Type "CD" Hole Punching Units

● Changing a setup of Wales Type "CD" Hole Punching Units with Patented Pilot Pins *only* requires removing the pair of operating templates from the press and replacing them with the next complete setup. With these templates, setups of Units are made outside the press and are ready to operate when bolted to die set. *Press "down time" is only a matter of minutes.* No adjustments are required between Units in the press.

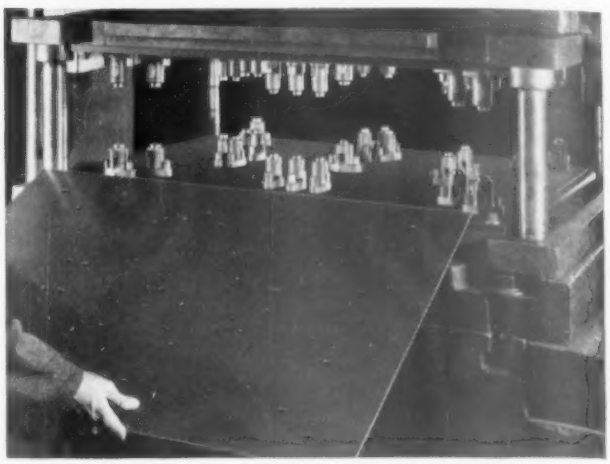
Uniform shut height of Wales Type "CD" Units provides an unlimited interchange of setups with only one ram adjustment.

PATENTED Wales Type "CD" Units eliminate the customary expensive and time-consuming methods formerly associated with building a die to punch a multiplicity of holes by:—eliminating special stripper plates, punches and dies...simplifying die design and die making...standardizing punches, dies and stripping mechanisms...reducing setup time...reducing investment in tooling inventory...reducing die storage space to a minimum...permitting setups to be made outside the press...reducing die maintenance costs by providing interchangeable parts for all standard units...releasing experienced die setters for other work...providing low initial costs.

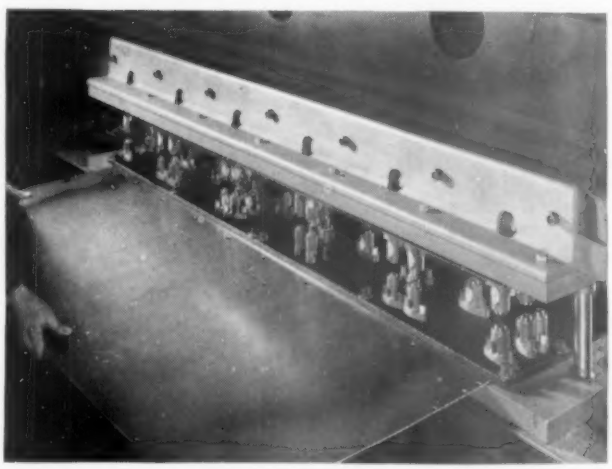
Tooling with Wales Equipment is reduced to a simple, quick assembly operation.

The simplicity and economies of Wales Equipment are too BIG a story to tell on this page so write for fully illustrated, functionally-colored catalogs.

***NOTE: The Wales-Strippit Corporation has not granted permission to anyone to use this patented mounting method except with Wales Hole Punching and Notching Equipment.**



Showing a template setup of Wales Type "CD" Units in stamping press. Note the work in foreground.



Scattered, staggered and straight line hole punching patterns may be quickly, easily and economically put in operation with Wales Type "CD" Units mounted on templates

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, President

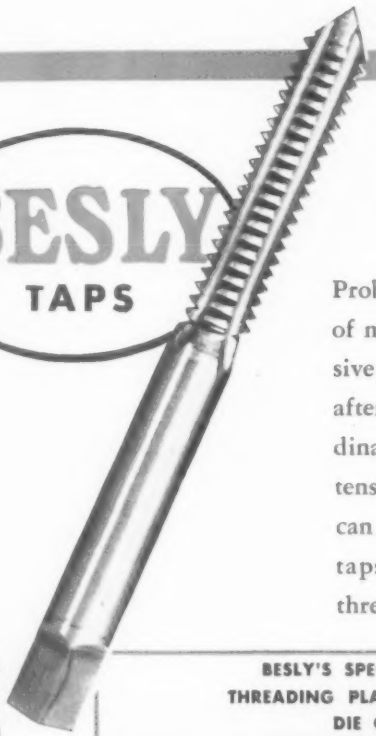
393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

Are You Tapping—

- ✓ Plastics?
- ✓ Abrasive Materials?
- ✓ Jobs That Require Plating After Tapping?
- ✓ Die Castings?
- ✓ Sheet Metal?



BESLY TAPS

Let Besly's "HELPING HAND" Give You Better Threading—at lower cost!

Problems involved in the threading of materials which are highly abrasive or have a tendency to "close in" after tapping require more than ordinary tap engineering. Through intensive research on these jobs, Besly can now provide specially treated taps that assure clean, accurate threading of materials of this type at the lowest possible cost to you. Check the chart below — see how many of your tapping problems demand the qualities specifically provided by specially treated taps. Then check with your nearest Besly distributor today. He'll be glad to lend a "Helping Hand"— without obligation.

HELPFUL FACTS FOR TAP USERS

Ask for free copy of valuable manual with information on taps and tapping, and listings on drill sizes and tap fits.

BESLY'S SPECIALLY TREATED TAPS FOR THREADING PLASTICS, ABRASIVE MATERIALS, DIE CASTINGS, ETC. GIVE:

Abrasive Resistance —
Special Surface treatment to increase tap life.

Free Cutting —
For automatic screw machine work.

Free Fit —
To accept Gauge after plating.

Free Assembly —
With power screw drivers.

Besly's "Helping Hand" has 5 Strong Fingers

- Fast Delivery
- A Complete Line
- Top Tap Quality
- Engineering Counsel
- Qualified Distributors

You'll Do BETTER with **BESLY**

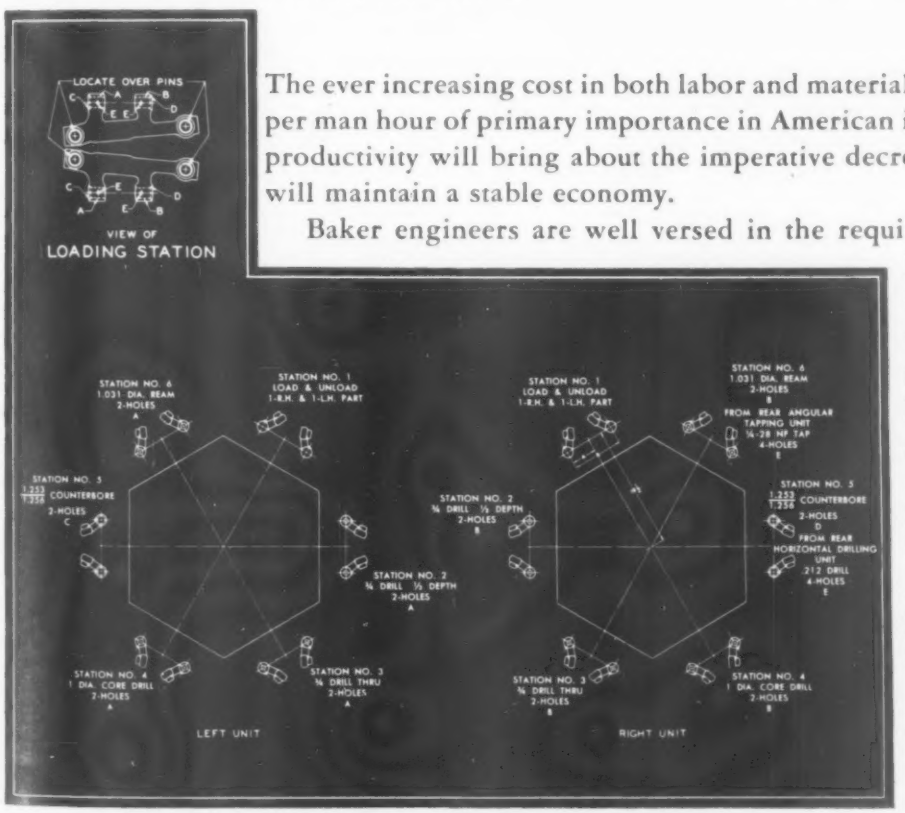
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS
BESLY GRINDERS AND ACCESSORIES

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois
Factory: Beloit, Wisconsin

INCREASED PRODUCTIVITY
. . . MEANS LOWER COST!

BAKER
PRODUCTION MACHINES

Baker multi-operation machine does drilling, boring, reaming, counterboring and tapping operations on automobile front wheel spindle supports.

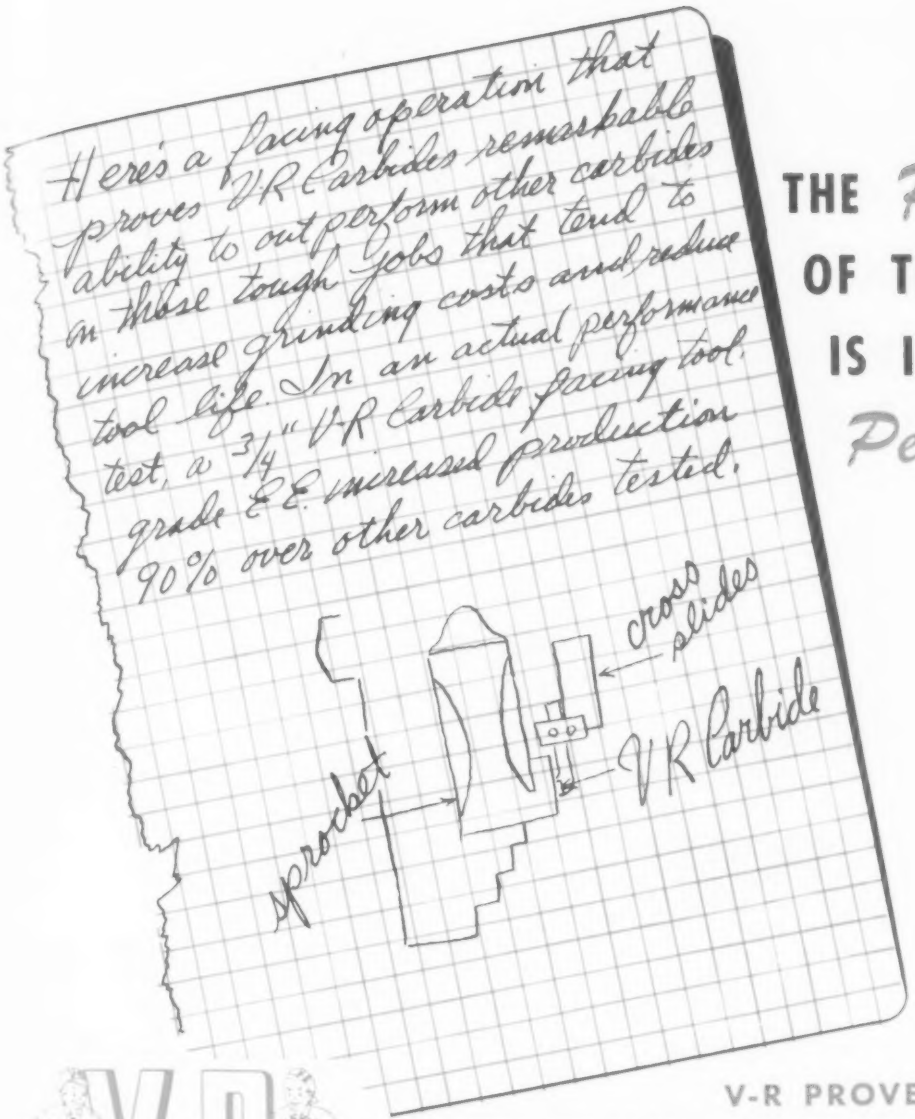


The ever increasing cost in both labor and materials makes greater productivity per man hour of primary importance in American industry today. Only greater productivity will bring about the imperative decrease in production cost that will maintain a stable economy.

Baker engineers are well versed in the requirements of today's industry. Every Baker special machine is designed specifically for utmost productivity, minimization of wear and work handling, and consolidation of operations to allow lower operating cost of machinery. For all requirements in drilling, boring, tapping and reaming machinery consult Baker engineers for the key to Increased Productivity as applied to your specific problem.

BAKER BROTHERS—Inc.
TOLEDO
OHIO

DRILLING, TAPPING, KEYSEATING AND CONTOUR GRINDING MACHINES



THE *Proof* OF THE CARBIDE IS IN THE *Performance*

V-R PROVEN PERFORMANCE

MACHINE: Potter & Johnson Automatic, 6 years old
MATERIAL: Tough, Scaly Steel Castings
OPERATION: Facing sprockets. 1/8" to 1/4" depth of cut from 7 3/4" O.D. to 4 1/8" I.D.
TOOLS: 3/4" Carbide Tipped Facing Tool

The Proof:

	V-R Carbide, Grade EE	Carbide "A"	Carbide "B"	Carbide "C"
S.F.M.:	194 to 116	194 to 116	194 to 116	194 to 116
Feed per Rev.:	Hand Feed	Hand Feed	Hand Feed	Hand Feed
Depth of Cut:	1/8" to 1/4"	1/8" to 1/4"	1/8" to 1/4"	1/8" to 1/4"
Pcs. per Grind:	100	8	10	9
Remarks:	V-R Carbide finished the remainder of 500 sprockets with a single tool, reground only 5 times.			

Many times the application of V-R Carbides to a particularly difficult problem is unique—the result of an unprecedented need arising from some new development in industry—and V-R Carbides provide sure, economical production. Call your nearest V-R Field Engineer today for a quick, economical solution to YOUR tool problem.

VASCOLOY-RAMET CORPORATION WAUKEGAN ILLINOIS
District Sales and Service in Principal Cities

An affiliate of The Fansteel Metallurgical Corporation and The Vanadium Alloys Steel Company

TRIPLE SAVINGS

with SCULLY-JONES

REMOVABLE TIP CORE DRILLS

YES, they save you money three ways—

1. **Holders outlast many tips;** tough core resists breakage; glass-like hardened finish withstands nicking and burring.
2. **You save set-up time;** Morse Taper shank is easy to insert in spindle of radial drills, drill presses, boring mills or special machines, and is quickly ejected with a drift key.
3. **You save "down time";** Stub Taper shank on tip permits easy insertion, ejection without removing holder from spindle.

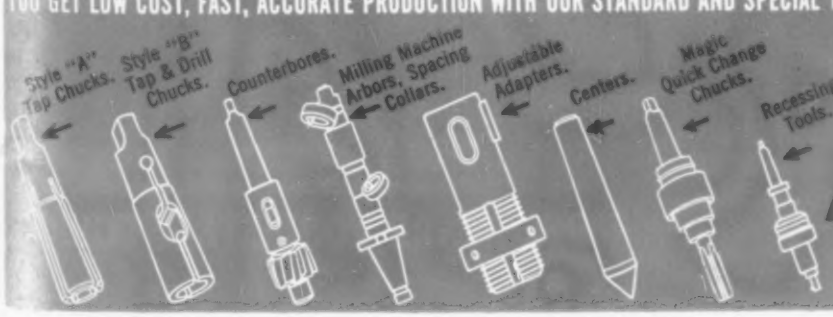
Cored holes can be cleaned up more accurately as the four-fluted tips take cuts that may be uneven due to any shift in core.

Positive Tang Driven, Rigid Holders with wide lands and tapered shanks assure a true running tool.

For complete information see pages 182-184 of Scully-Jones Tool Engineering Manual 500.

IMMEDIATE DELIVERY
on Scully-Jones Removable Tip Core Drills for most core drilling conditions

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS



Scully-Jones AND COMPANY

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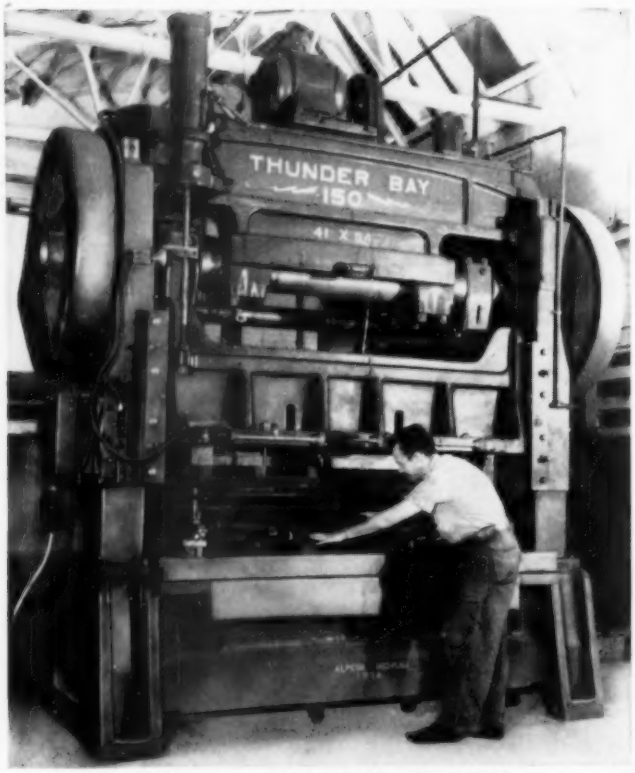
THUNDER BAY PRESSES



SINGLE OR TWIN DRIVE OPTIONAL

IMMEDIATE DELIVERY

ON SOME MODELS

Thunder Bay straight side, tie-rod construction presses are built with controlled (semi-steel) gray iron castings from our own foundry. Ruggedly designed to minimize down-time and structural failures, Thunder Bay Presses are available in 100, 150, 200, 250, 300 and 400-ton capacities, in a wide variety of bed sizes and strokes. Features include Ampco Bronze Liners in crank bearings; friction clutches, and one shot lubrication. Long life and performance are built into every Thunder Bay Press. Phone or write today.

THUNDER BAY MANUFACTURING CORP.

DESIGNERS & BUILDERS of SPECIAL MACHINERY
TOOL & DIE MAKERS • GRAY IRON FOUNDERS
DETROIT & ALPENA, MICHIGAN

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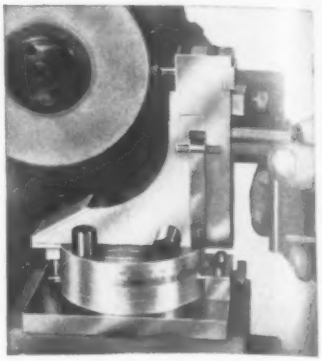
★ ★ ★ *Fluidmotion*®

Simplest and Most Accurate Method of

FORM-DRESSING



● "Fluidmotion" Wheel Dressers generate wheel profiles in such a way that angles and radii flow into each other, without sharp changes of direction. Two angles and a radius can be dressed in one continuous motion—after only one setting of the dresser. "Fluidmotion" Dressers are made of the the finest chromium-molybdenum-vanadium alloy steels and have no wearing surfaces, as the gibs and V ways are positioning surfaces only and the dresser swivels on completely dust-protected ball bearings. Several models available. Model F, illustrated, is the smallest. 5" height to diamond center, dresses wheels up to 7" in diameter, profile radius up to 2". Write for booklet.

*Reg. U. S. Pat. Off.

J&S TOOL CO., INC.
485 Main Street, East Orange, N. J.
Representatives in Principal Cities

DELAWARE

Controlled Atmosphere **FURNACE!**

"Precision Hardening for Precision Tools".

Sufficiently
NEW
to be outstandingly different!

Sufficiently
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to be thoroughly tested and proven!

Range
1200°F to 2800°F

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DELAWARE TOOL STEEL CORP.
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BROWN & SHARPE *offers*

8

Two-Flute, Fast Spiral Double-End End Mill with 3/16" straight shank.

Fast Spiral Double-End End Mill with 3/16" straight shank.

Long, Two-Flute Fast Spiral Double-End End Mill with 3/16" straight shank.

Long, Fast Spiral Double-End End Mill with 3/16" straight shank.

Ball End, Two-Flute Fast Spiral Single-End End Mill with straight shank.

Long, Two-Flute Fast Spiral Single-End End Mill with straight shank.

Long, Fast Spiral Single-End End Mill with straight shank.

Extra-Long, Fast Spiral Single-End End Mill with straight shank.

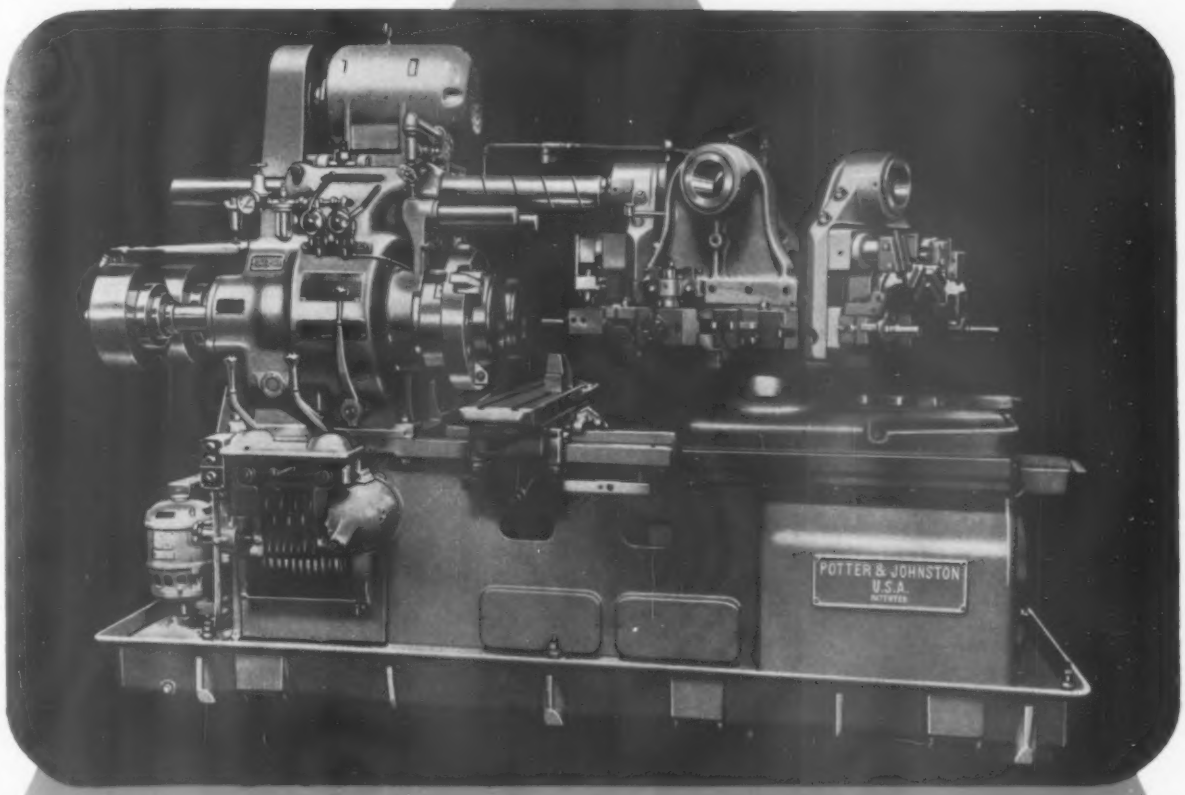
These 8 types of end mills, now added to the Brown & Sharpe line, are made in a complete range of sizes to meet practically all work requirements. Together with many new sizes in other designs previously offered, their addition provides an even broader, better selection of Brown & Sharpe quality end mills.

All end mills in this new group have the same design and construction features that distinguish Brown & Sharpe end mills for their fast, clean-cutting characteristics. They will help you improve the efficiency of end mill operations . . . producing more work at lower cost. Get complete information on these new additions and the new breadth of the Brown & Sharpe line of end mills. Write for new End Mill Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE CUTTERS B·S

Three important angles to consider on P.&J.'s productive



5D-2 *SPINDLE POWER-FLEX* AUTOMATIC TURRET LATHE

1. Machines castings and forgings up to 15¼" dia.
2. Does the work fast, accurately, economically
3. Brings a quick return on the investment.

SPECIFICATIONS

		5D-2-9	5D-2-12	5D-2-15
BED	swing over: dia. of work limited by spindle	21 1/2"	21 1/2"	28"
	to spindle center distance	10 1/2"	15 1/2"	15 1/2"
CROSS SLIDE	travel each way	5"	5"	5"
TURRET	no. of faces	5 & 6	5 & 6	5 & 6
	slide travel	11 1/2"–8 3/4"	15 3/4"	15 3/4"
TOP SPINDLE SPEED		615 rpm.	613 rpm.	525 rpm.

The primary function of a machine is to make money for the owner. In order to make money, however, it has to produce work a little better, a little faster and a little more economically than comparable machines. For specific work, in this instance the machining and finishing of castings and forgings up to 15¼" dia., POTTER & JOHNSTON'S rugged and rigid 5D-2 SPINDLE POWER-FLEX AUTOMATIC TURRET LATHE has no superior. It has been designed to meet production requirements. Every machine has power, great rigidity, 4 automatic changes of spindle speed while under cut; 3 selective automatic changes of feed; automatic binding of the turret following index; powerful, direct cross slide action and a constant high speed motion to the cross slide and turret slide. This machine will bear close investigation by cost-conscious manufacturers. Write for complete information.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
Subsidiary of
PRATT & WHITNEY
Division Niles—Bement—Pond Company

These machines AND operators

Cost basis is 80% efficiency for 6000 hours, good wage rate

Cost is low when production is high on a one-purpose machine. If these 6 machines operated at 80% efficiency for 6000 hours (a fraction of their useful life) and the operators were well paid, the cost per tool per part would average 8/100 of 1 cent. (No power or overhead). Some machines have few spindles, some have many. All 6 are basically different. Yet all such costs are in fractions of a cent per operation.

Accurate, Uniform Parts For Years

A Kingsbury will produce accurate, uniform parts to your specs for years. Here's how:

Uniform product. Automatic drilling and tapping units do the operations with unvarying cycles. Fixtures that index are identical duplicates.

Accurate location of operations. Bushings guide drills and reamers. All operations are finished without disturbing any part in its fixture. Spindles run in preloaded precision bearings.

Smooth finish. Spindles for different types of operations are independent and run at the exact speed and the exact feed required.

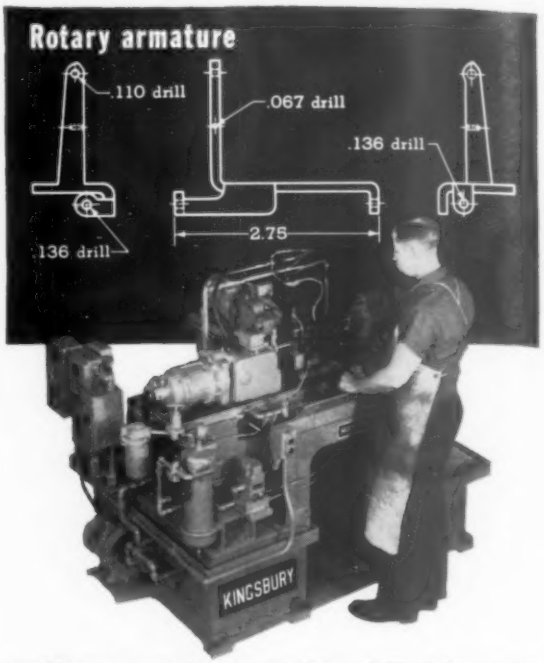
Accurate, rugged construction. Alloy steel wear parts, hardened and ground. Gears induction-heated and shaved. Castings stress-relieved.

Efficient Use of Standard Equipment

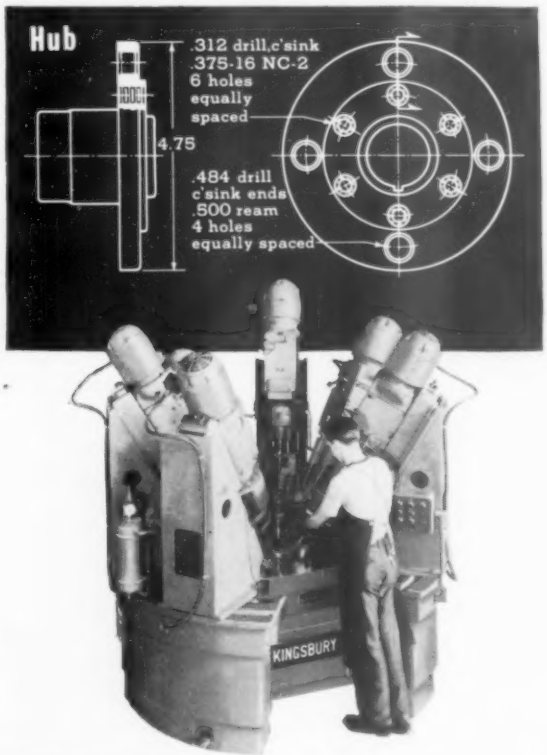
Our top men study and discuss ways to combine operations until they agree on the most economical solution. They consider our 6 basic types of machines shown here, our 12 standard automatic drilling and tapping units (max. 5 hp), the 82 standard attachments, 8 standard indexing units and 18 standard bases. We have designed, built and tooled over 3400 automatic drilling and tapping machines. It is our exclusive business.

Can We Save Money For You?

For a rough idea of your savings, consider *only* your operators' pay on a high production drilling and tapping job. If the cost exceeds the costs given here, ask our Mr. L. A. Carll for a proposal on a tooled machine. Send him a print showing the operations and hourly output you need. Free bulletins show 40 setups. Kingsbury Machine Tool Corp., 40 Laurel St., Keene, N. H. 81



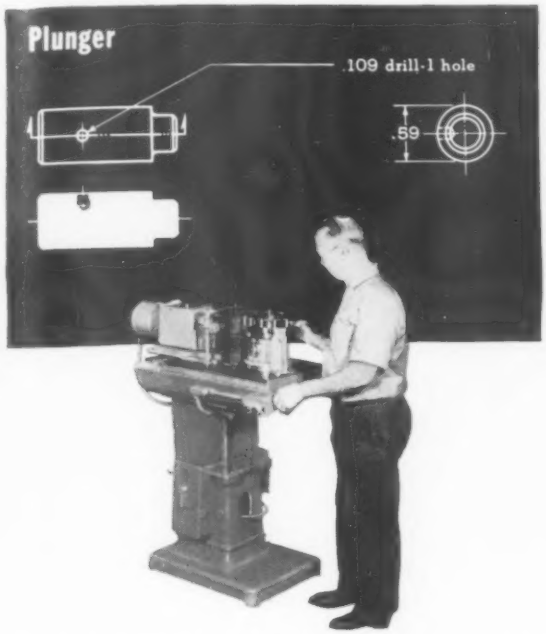
A multi-way non-index machine drills 3 faces of each part at once, clamps and unclamps automatically. To locate the drills for other parts, the operator moves the units in dovetails. 579 parts an hour gross. 15/100¢ per operation.



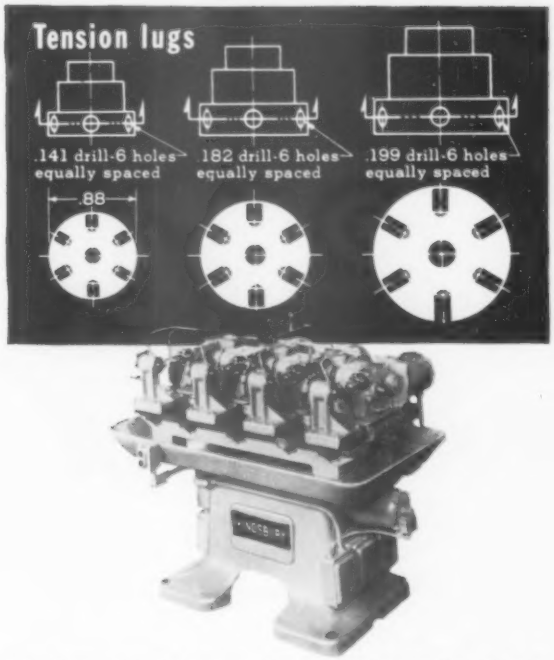
A horizontal indexing machine has 6 units mounted at a 60° angle to save space and still give clearance. Double eccentric tools countersink both ends of 4 holes at once. 30 spindles. 307 parts an hour gross. 6/100¢ per operation.

KINGSBURY . . . AUTOMATIC DRILLING

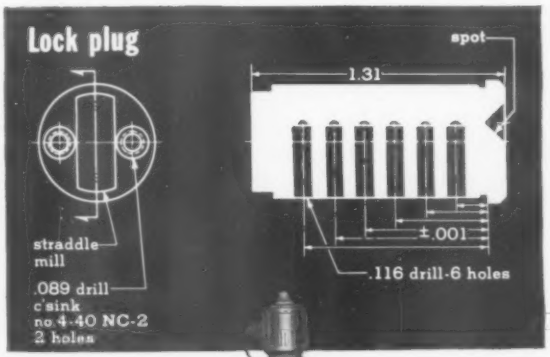
cost 8/100 of 1¢ per operation

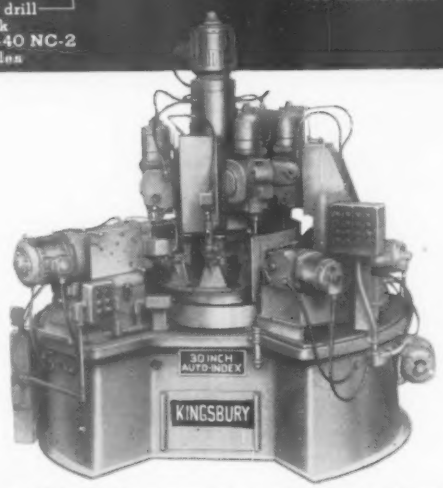


A dial feed machine has one unit that clamps and drills each part and indexes the dial. The operator places the parts in 12 recesses on the dial. Finished parts drop into a chute. 2660 parts an hour gross. 7/100¢ per operation.

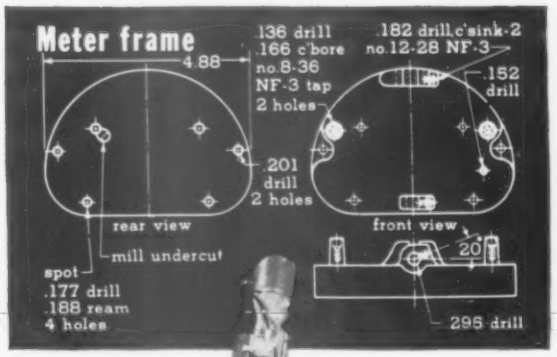


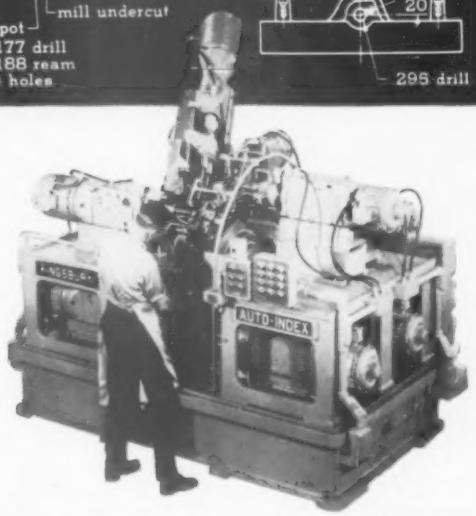
Indexing chucks have interchangeable collets that hold parts of different sizes. Each unit rotates one part on its axis 60° each index, drills 6 holes successively and then latches. 450 parts an hour gross. 9/100¢ per operation.





A horizontal indexing machine with central column has 7 horizontal and 6 vertical units. A 2-directional, 2-spindle auxiliary head on one unit works on both ends of the part. 690 parts an hour gross. 6/100¢ per operation.





A vertical indexing machine enables horizontal units to work on opposite faces. Angular units operate on the no. 12-28 holes. A radial unit (hidden) drills the .295 hole. 27 spindles. 978 parts an hour gross. 3/100¢ per operation.

AND TAPPING MACHINES *For Low-Cost High Production*

have we your right address?

if you've moved, notify ASTE headquarters of your new address so that THE TOOL ENGINEER and other society information will reach you promptly. Write your NEW and OLD address on a penny postcard and mail to:

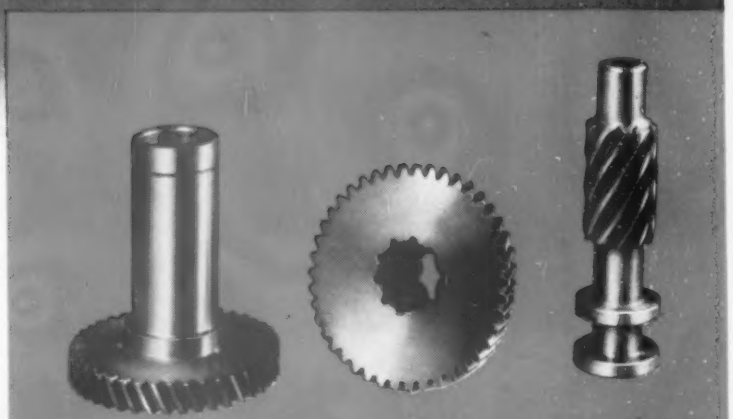
American Society of Tool Engineers
1666 Penobscot Bldg., Detroit 26, Michigan

Check Your Procedure In The Red Ring Gear Laboratory *Before* You Start Gear Production

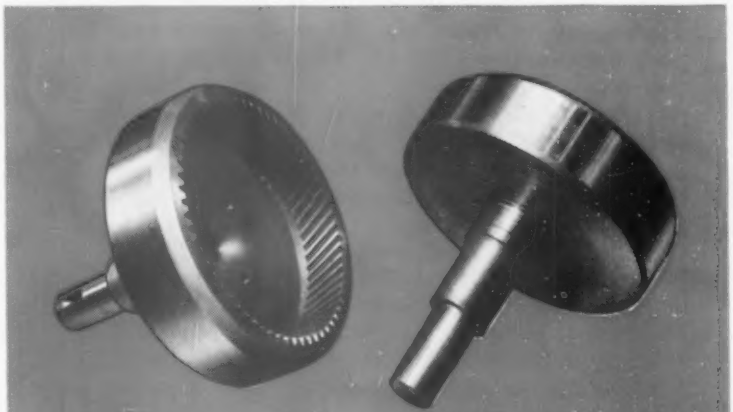
THE Red Ring Gear Laboratory has been organized for your convenience and assistance. You may have a pilot job you want produced or a limited number of special gears, perhaps gears having very close tolerances which you need for experimental or research work. You may have questions involving gear design, the choice of gear materials, methods of processing, heat treatment, or gear finishing.

The Red Ring Gear Laboratory, with its staff of gear specialists and full complement of gear processing machinery, can help you solve these problems and turn out gears for you in limited quantities—any type of spur or helical gear and to any degree of precision.

Red Ring Gear Engineers will be very glad to discuss with you any problem in this field. The gear laboratory is not set up for production runs of any type of gears.



Gear used in radar equipment having 42 teeth, 26.4810 N.D.P., 18°-15'-22" N.P.A. and a right hand helix angle of 25°. Also external and internal splines having 10 teeth, 20 N.D.P., 30° N.P.A. and 31°-34'-26" helix angle. Units had to assemble on a nonselective basis.



Marine reduction gear having 61 teeth, 7 N.D.P., 18° 17' N.P.A. and a 24°-45'-43" helix angle.

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • • • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Now!
AUTOMATIC OPERATION *for higher* **TAPPING PRODUCTION**

THE *Ettco-Emrick*

ELECTRIC-AIR CONTROLLED TAPPING MACHINE

This new machine—equipped with Ettco-Emrick multiple head and work holding units engineered to your specific small parts tapping needs—gives you any tapping production you want.

Its electric-air control gives that production with full automatic operation—regulates depth of stroke—clamps the work—operates the work holding fixture—and ejects finished parts.

Changing head and work holder units from job to job is a matter of minutes. You can also set the machine for semi-automatic operation if desired, or use it for single spindle operation with Ettco-Emrick Tapping Attachments.

For details on this outstanding new tapping development

WRITE FOR FULL INFORMATION

ETTCO TOOL CO.

593 Johnson Ave., Brooklyn 6, N. Y.

Boston, Mass. • Portland, Conn. • Detroit, Mich. • Chicago, Ill.

Over 25 years specialization in solving industry's drilling and tapping problems

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IMPROVED EFFICIENCY

Photo courtesy American Broach & Machine Co.

WITH

RUTHMAN GUSHER COOLANT PUMPS

For improved efficiency in your metal cutting operations specify Ruthman Gusher Coolant Pumps.

Oversized pre-lubricated bearings reduce maintenance cost. Electronically balanced rotating parts assure quiet operation and longer life. Split-second control of coolants, from a trickle to full volume, gives coolant flow where you want it when you want it.

Illustrated is an American VP-5-25-40 Broaching Machine equipped with a Model 11022-C ½ HP Gusher Coolant Pump.

Write now for Catalog 10-I

THE RUTHMAN MACHINERY CO.

1810 Reading Road — Cincinnati 2, Ohio

"MASTERCASING" . . . A WORD YOU WON'T FIND IN THE DICTIONARY, *BUT* . . .

It means a lot to men who have used MASTERFORM high speed cutting tools. This special heat treating process in MASTERFORM tools assures the ultimate in cutting tool efficiency — *maximum production at minimum tool cost.*

Actual production data reports show that MASTERFORM cutting tools have up to

500% LONGER LIFE

Want faster, deeper cuts . . . precision hole production? Write for complete information and prices on our standard tool designs, or submit your special tool design problems to our engineering department.

WE SPECIALIZE IN CARBIDE TIPPED TOOLS

MASTERFORM TOOL CO.

2550 Irving Park Road • Chicago 18, Ill.

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:

Is the correct abrasive available?

ANSWER BY

CARBORUNDUM
TRADE MARK

The Carborundum Company produces the only complete line of abrasives under one trade mark. With industrial techniques utilizing a wider variety of different abrasive products, it is only logical to turn to The Carborundum Company as the one primary source of all abrasive needs.

The specialized service of experienced representatives is available to recommend, impartially, the best abrasive products for specific requirements. Product quality is known and highly regarded. Satisfaction is assured. Responsibility is definitely fixed and undivided.

In part, this helps explain the increasing preference for abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, N. Y.

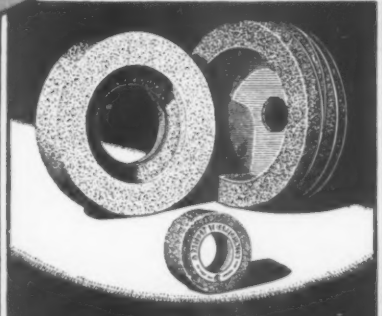
CARBORUNDUM
TRADE MARK

BONDED ABRASIVES
COATED ABRASIVES
ABRASIVE GRAINS AND FINISHING COMPOUNDS

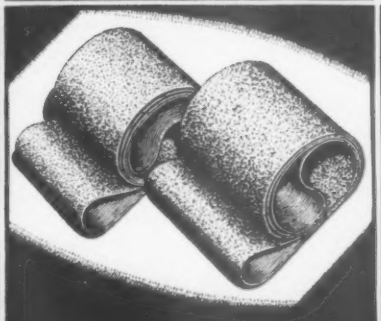
Specialized wheels by CARBORUNDUM for thread grinding.

Diamond wheels to meet stiffer technical needs.

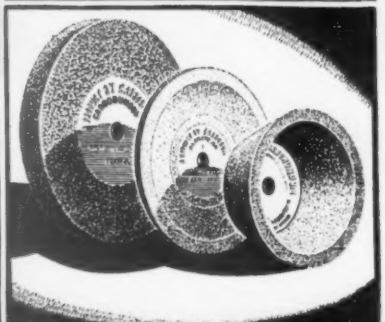
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Cool-cutting GREEN GRIT wheels for cemented carbide.



A coated abrasive for every sanding and finishing condition.



All standard shapes are supplied in grinding wheels by CARBORUNDUM.

27% more holes per grind

with this CLE-FORGE stock drill

Gives Big Increase in Performance

● CLE-FORGE High Speed Drills had been giving good performance on this job—drilling holes 1¾" deep in cast iron at 80 f.p.m., with an average of 245 holes per grind. ◈ One of our Service Representatives, however, believed that even better results could be obtained by using another type of CLE-FORGE High Speed Drill (also a stock item). By following his recommendation *the average number of holes per grind was increased to 312.* ◈ *Cleveland* Service Representatives are trained to help you increase your production and reduce your costs. Contact our nearest Stockroom, or . . .

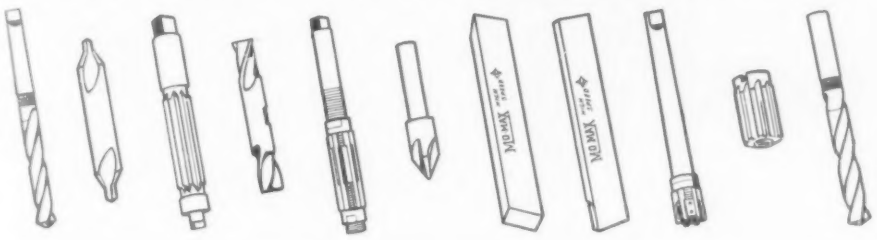
Telephone Your Industrial Supply Distributor.

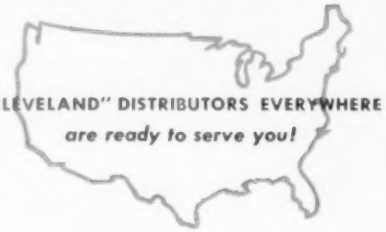
CLEVELAND

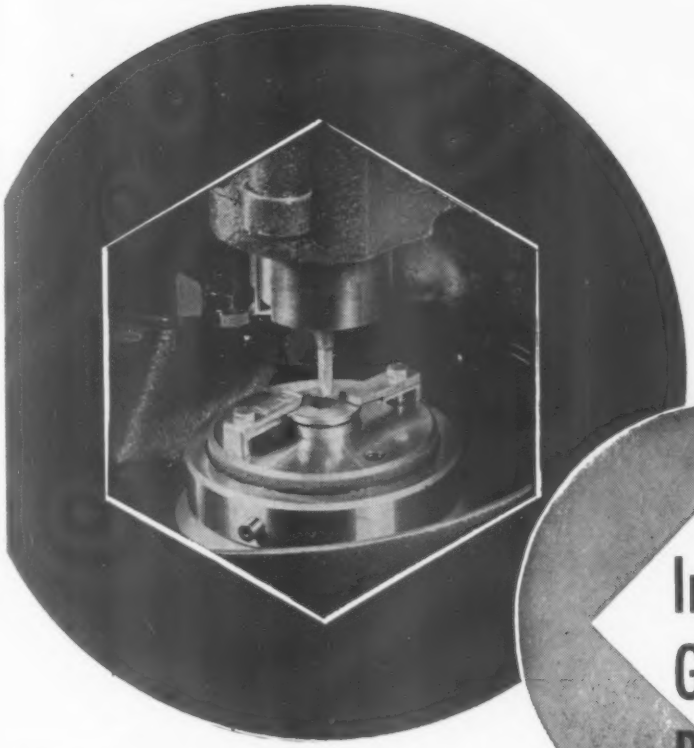
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street **Cleveland 14, Ohio**
Stockrooms: **New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5**
Los Angeles 11 • London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS

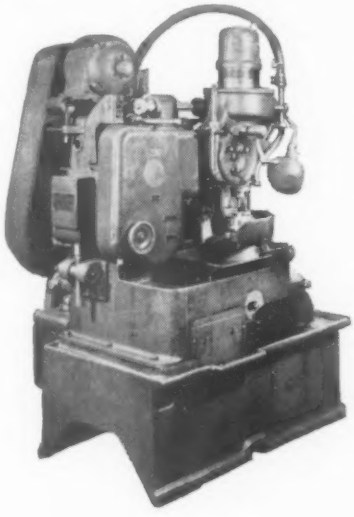






Internal Contours Generated to a PRECISE TAPER

Generating hexagonal trim dies on the Fellows Gear Shaper at The Cleveland Cap and Screw Company.



The high-precision ability of the Gear Shaper to generate symmetrical, angular or irregular contours, internal as well as external, carries suggestions to designers in many industries. Hexagon or square trim dies, for instance, can be generated to a controlled taper, as low as ½ degree, with close-tolerance duplicating accuracy.

The versatility of the Gear Shaper on non-gear jobs opens the door to the practical production of many intricate shapes... increases the scope of low cost machining at the designers' command. A reading of our illustrated book, "The Art of Generating with a Reciprocating Tool" will prove of interest to every production-minded design engineer. The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2, 640 West Town Office Bldg., Chicago 12, 7706 Empire State Bldg., New York 1.

Fellows

SUPER *Carbide Tipped* SPECIAL TOOLS

SUPER *Carbide Tipped* STANDARD TOOLS

EJECTOR-TYPE TOOLS
DRILLS
REAMERS
SPOTFACERS
FORM TOOLS
WEAR PARTS
BORING TOOLS
MILLING CUTTERS
SHAVING TOOLS
CENTERS
GRINDER RESTS
COUNTERBORES

Get the benefit of *Super's* many years of experience, solely in the field of Carbide Tipped Tools.

It will pay you dividends.

Special Tools to your specifications — Carbide Tipped — Solid Carbide—all produced by *Super* skilled engineers and craftsmen.

SUPER TOOL COMPANY

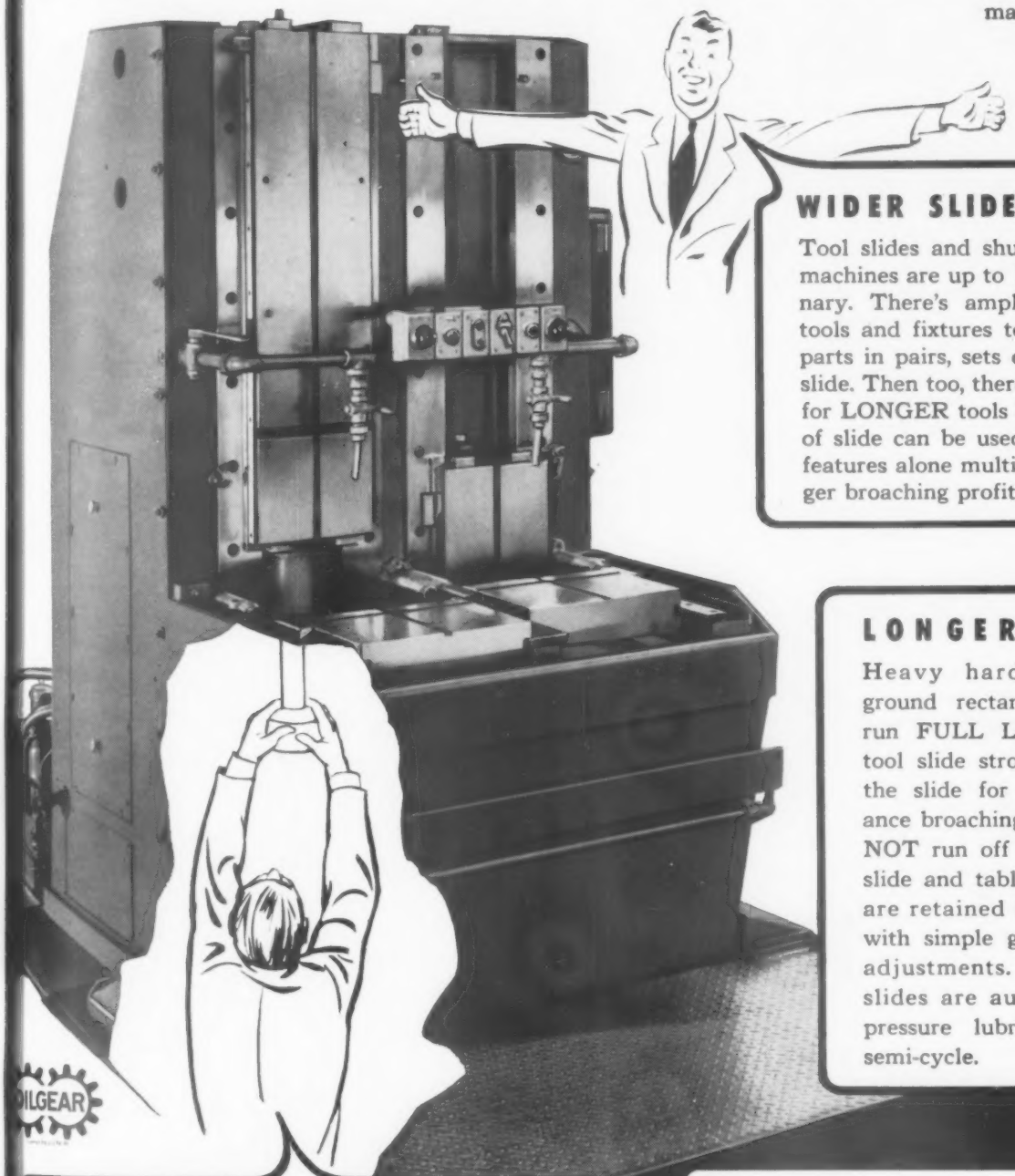
Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 5210 San Fernando Road, Glendale 3, California

...IN OILGEAR SURFACE BROACHING MACHINES

When you purchase an Oilgear Surface Broaching Machine you get a big bonus of features which are not incorporated in other machines.

Consider these important features carefully for if you don't get Oilgear *features* you can't get Oilgear *performance*.



WIDER SLIDES AND TABLES

Tool slides and shuttle tables on Oilgear machines are up to 130% wider than ordinary. There's ample room for grouping tools and fixtures to broach two or more parts in pairs, sets or sequence on EACH slide. Then too, there's up to 4" more room for LONGER tools because the full stroke of slide can be used for broaching. These features alone multiply production for bigger broaching profits.

LONGER WAYS

Heavy hardened and ground rectangular ways run FULL LENGTH of tool slide stroke to guide the slide for close tolerance broaching. Slides DO NOT run off ways. Close slide and table clearances are retained indefinitely with simple gib and way adjustments. Ways and slides are automatically pressure lubricated each semi-cycle.

TOOLS ARE PULLED . . . NOT PUSHED

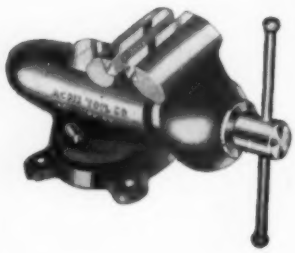
Cylinder ram PULLS slide downward to broach work; ram is in TENSION under broaching load and not in compression. There's no ram DEFLECTION to cause wear on ram, packing and cylinder. Positive delivery of oil to pulling side plus a rigid column of oil on return side gives SMOOTH operation. Then too, you get up to 100% higher return speed and save power with our simple regenerative system.

These are only a few of the many exclusive features in Oilgear Fluid Power Variable Speed Broaching Machines. Write for complete descriptive bulletins. THE OILGEAR COMPANY, 1308 W. Bruce St., Milwaukee 4, Wisconsin.

Oilgear Fluid Power

PRACTICALLY INDESTRUCTIBLE

ACME BENCH VISES have ALL these features

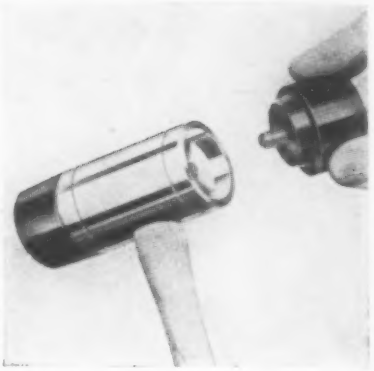


Maximum Gripping Power
Longer Vise Life
No Side Twist or Wobbling
Unbreakable Sleeve Unit
Interchangeable Ground Jaws
Swivel Bases
11 Sizes from 2" to 6"

Also ACME COMBINATION PIPE AND BENCH VISES with same outstanding features available with 4½" wide jaws. Holds pipe ⅛" to 3½".

NUPLA MALLETS

with Interchangeable Tips



Nupla Mallet Tips give you tough, resilient and self-healing qualities that no other mallet possesses. Made in three grades, "S"-Soft, "M"-Medium, "T"-Tough.

Will not mar machined or delicate surfaces. No "Flying Particles" to endanger workmen's eyes. No sting, vibration or rebound.

No explosion or fire hazard.

Can be had non-conductor of electricity (specify when ordering).

A Mallet for Every Purpose; A Purpose for Every Mallet

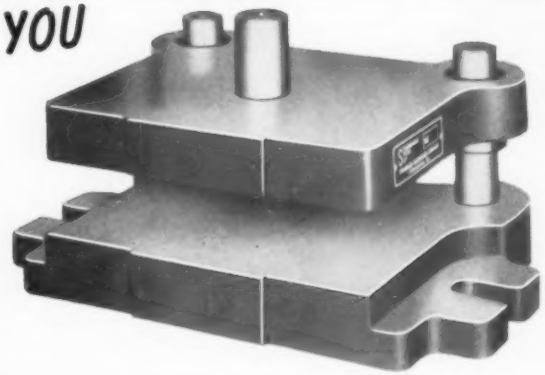
PRECISION PRODUCTION TOOLS

ACME TOOL COMPANY

75 West Broadway New York 7, N. Y.

VISIT OUR BOOTH 732
METAL SHOW
Philadelphia
Oct. 25-29

GOOD REASONS WHY YOU SHOULD SPECIFY . . .



"Standard" STEEL DIE SETS

1. ACCURATE
Manufactured to extremely close limits.

2. PRODUCTIVE
All parts steel . . . instantly interchangeable.

3. LONG LIVED
Guide pin bushings lined with Indium Bronze.

4. SIZED FOR THE JOB
Complete range of sizes from stock: special sizes to order.

5. AVAILABLE
Immediate delivery of cataloged set sizes.

Write for Catalog DS.

Sketch pads available for use in ordering special die sets. Ask for a supply

STANDARD MACHINERY COMPANY

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Branch Warehouses:

CLEVELAND	DAYTON	DETROIT	INDIANAPOLIS	NEW YORK	WORCESTER
The Die Supply Co.	George D. Laughter Co.	Diemaker Supplies Co.	Standard Die Supply, Inc.	Acme-Danneman	Lindco, Incorporated
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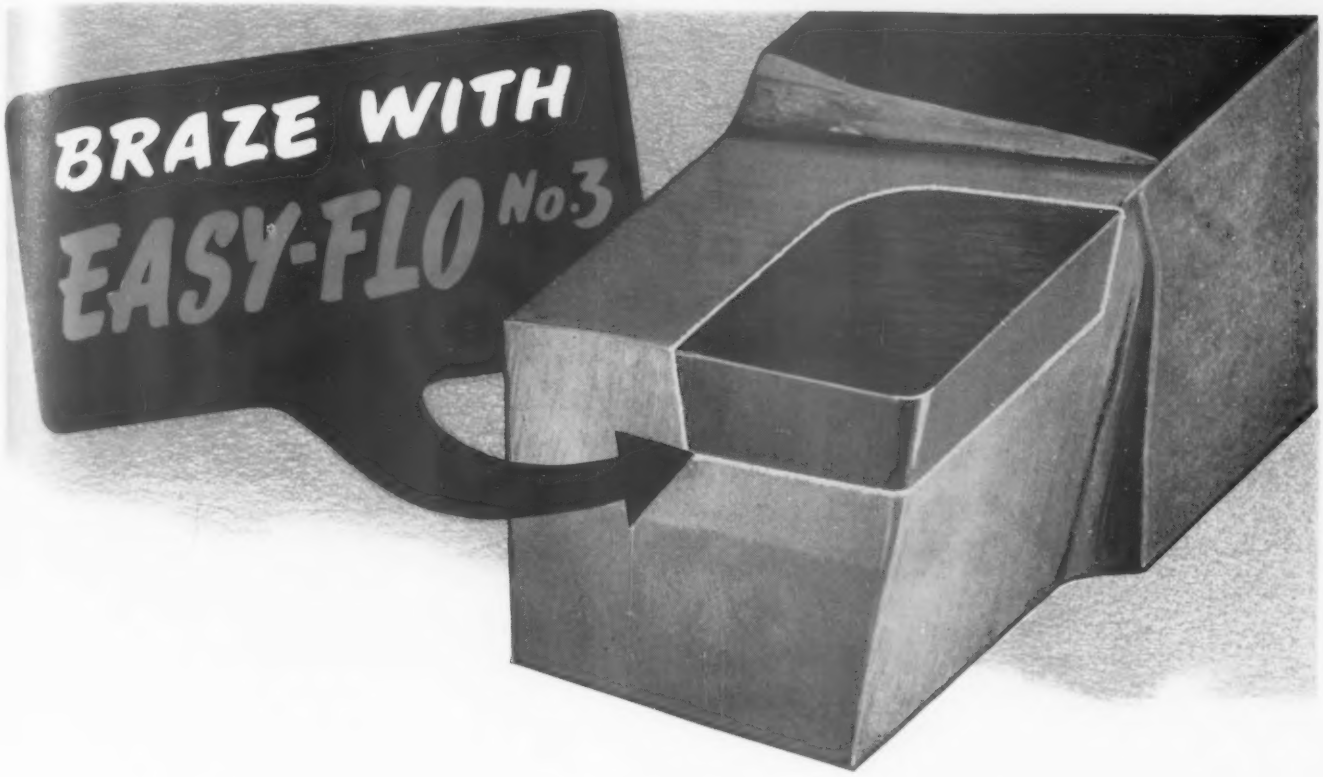
UTah 1-0550	KEnmore 4191	TRinity 1-2865	Riley 5824	CAnal 6-1760	WOrcester 6-4637



---there's no better way to mount carbide tool tips

You can get any required tool tipping production by preparing assemblies for brazing with EASY-FLO No. 3 preplaced and using a fast heating set-up. The illustration shows such a set-up using a Tocco induction heating unit.

Brazing tool tips with the low-temperature silver alloy EASY-FLO No. 3 is as easy as can be—it is fast—it makes joints of exceptional strength—its cost is surprisingly low—it is recommended by leading carbide tip manufacturers. The EASY-FLO No. 3 brazing method is good for one tool or thousands—and for all types of tools that need tipping.

BULLETIN 11-A →

explains the EASY-FLO No. 3 method step by step and tells you how to get fast production. Write for a copy today.

HANDY & HARMAN

HANDY & HARMAN FOUNDED 1867

82 FULTON STREET NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal • Providence, R. I. • Toronto, Canada

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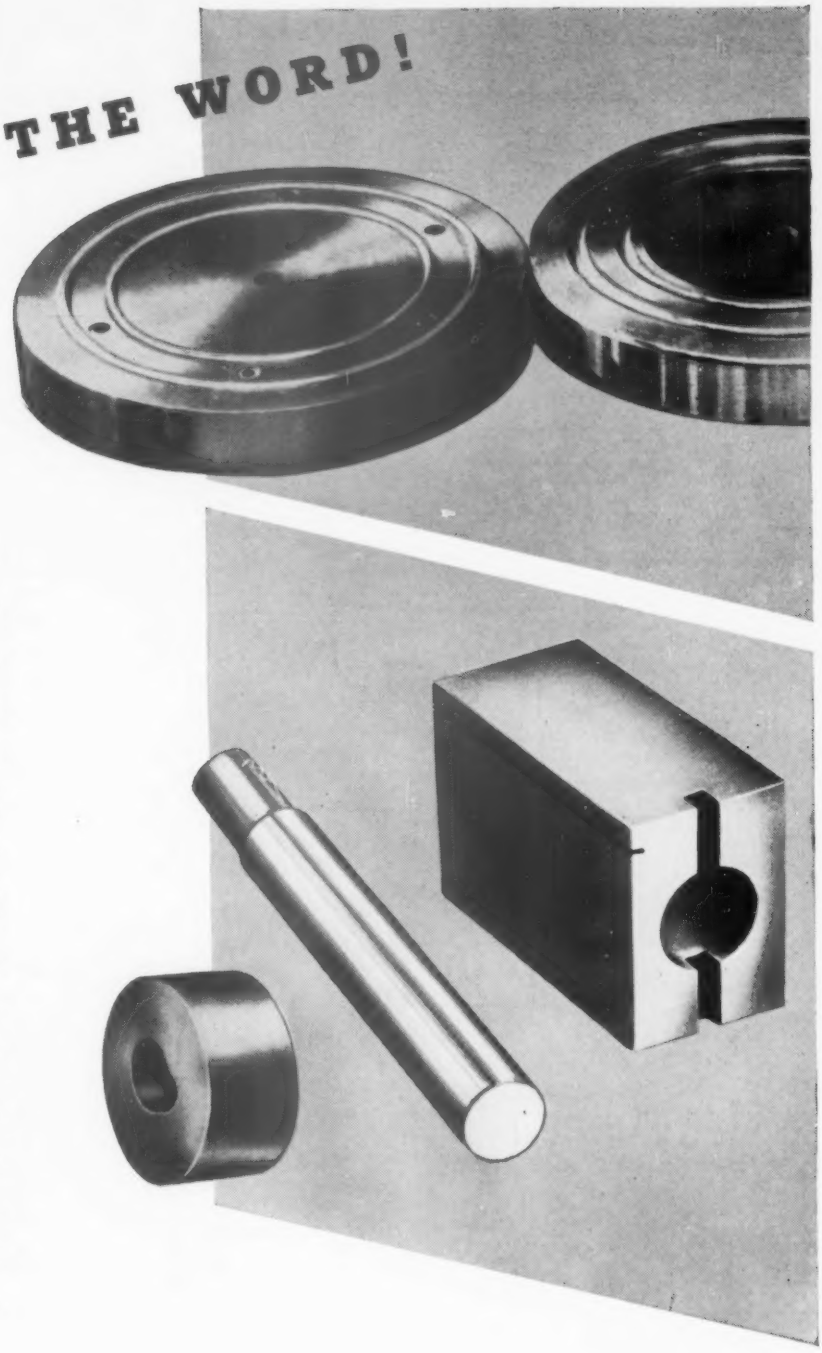
CONSTANT IS THE WORD!



Midvale Constant tool steel is what its name implies . . . unchanging in form and dimension, invaluable where non-distortion in hardening is an important factor. Constant is an electrically melted alloy tool steel made of hand-picked raw materials. It has great depth of hardness—is exceptionally wear-resistant and free from cracking. It files, grinds, machines—has fine cutting qualities. This versatility makes Constant ideal for many types of cutters, hobs, reamers, dies, jigs, punches, gauges, press and forming tools and chasers.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

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MIDVALE

Custom Steel Makers to Industry

STAINLESS AND TOOL STEEL BARS
•
CORROSION AND HEAT RESISTING CASTINGS
•
FORGINGS AND RINGS

Index of Tool Engineer Advertisers

September, 1948

EX-CELL-O CAN GIVE YOU MORE ECONOMICAL PRODUCTION

. . . for instance:

This view of the tooling on an Ex-Cell-O Precision Boring Machine shows an arrangement for precision taper turning valve plugs (*at left*) and for precision taper boring the mating bodies (*at right*). Plugs and bores must be perfectly round and straight, with tapers matched exactly, and with a mirror-like finish to assure air-tight valves. This Ex-Cell-O machine both semi-finishes and finishes both pieces in one machine cycle, producing interchangeable parts that pass air-pressure tests under water. Parts are machined at the net rate of 240 pieces per hour . . . This operation is typical of many devised by Ex-Cell-O engineers to solve precision machining problems for various industries where accuracy, fine finish, and maximum production and economy are the requirements. Maybe Ex-Cell-O can help you, too. Get in touch with your local Ex-Cell-O representative or write direct to the Ex-Cell-O head office in Detroit.

XLO
EX-CELL-O for PRECISION

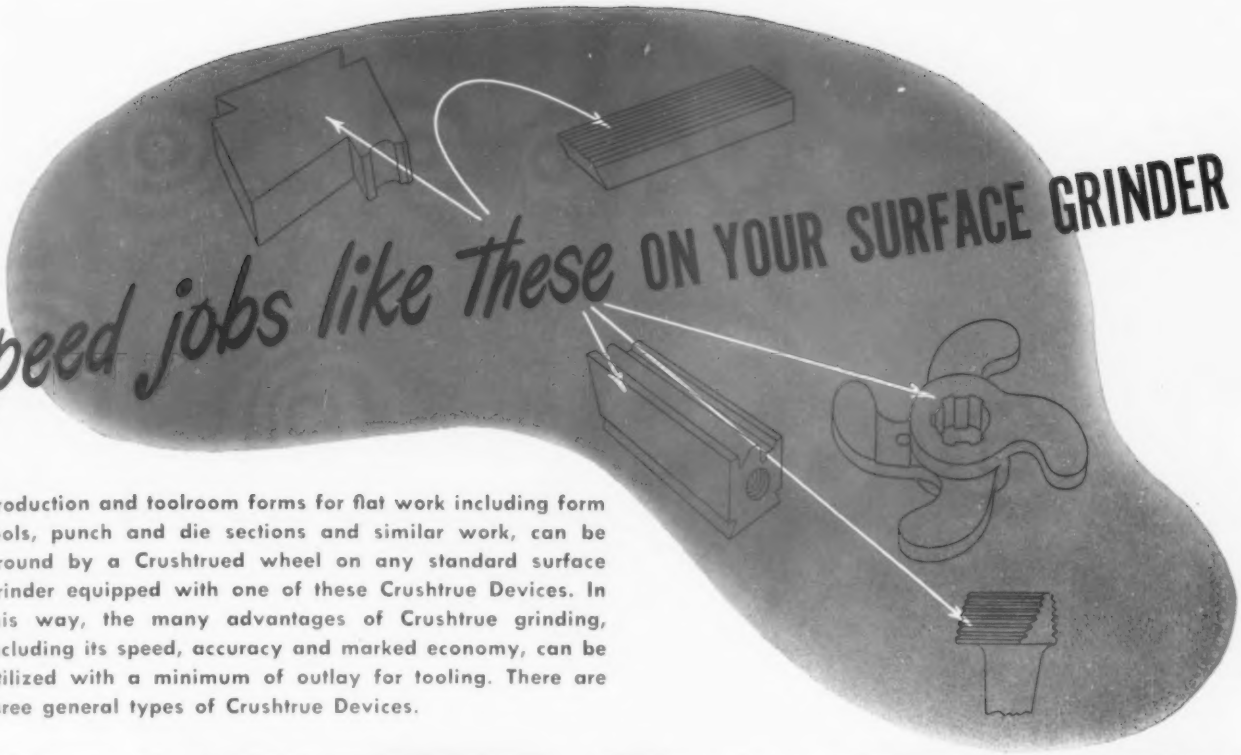
In circle to right: Brass valve body and plug finished by precision boring and turning operations on Ex-Cell-O Style 1212-A Standard Double End Precision Boring Machine.

EX-CELL-O CORPORATION

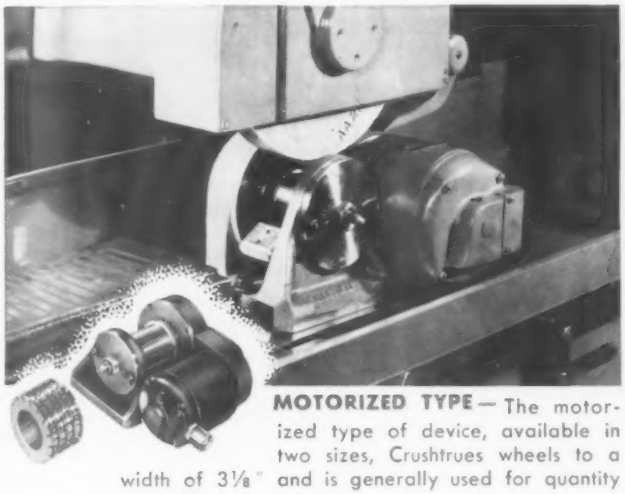
DETROIT 32, MICHIGAN

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles • Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

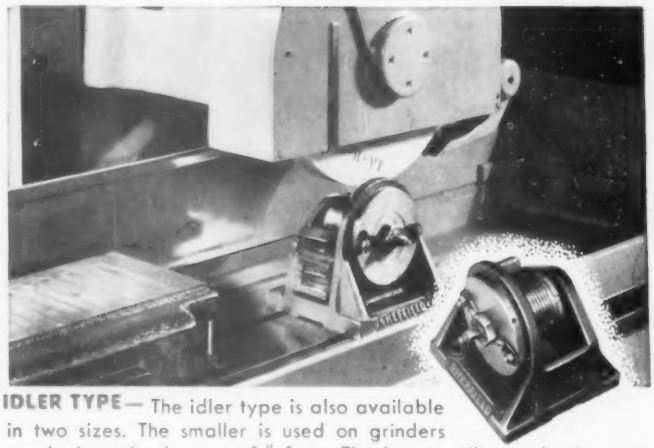
Speed jobs like these ON YOUR SURFACE GRINDER



Production and toolroom forms for flat work including form tools, punch and die sections and similar work, can be ground by a Crushtrued wheel on any standard surface grinder equipped with one of these Crushtrue Devices. In this way, the many advantages of Crushtrue grinding, including its speed, accuracy and marked economy, can be utilized with a minimum of outlay for tooling. There are three general types of Crushtrue Devices.

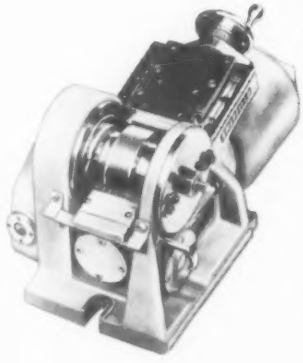


MOTORIZED TYPE— The motorized type of device, available in two sizes, Crushtrues wheels to a width of 3⅛" and is generally used for quantity production operations.



IDLER TYPE— The idler type is also available in two sizes. The smaller is used on grinders employing wheels up to 1" face. The larger utilizes wheels up to 3⅛" face. The units are generally used on grinders which have a slow speed spindle drive (approximately 300 fpm).

SELF-TRUING TYPE



The self-truing type is engineered especially for producing parts which must be held to a very high degree of uniformity. It incorporates a flat carbide form tool which is used to periodically reform the cast iron Crushtrue Roll without removing the roll from its mounting.

CRUSHTRUE ROLLS

Sheffield is prepared to regrind promptly, any Crushtrue Roll after it has become sufficiently worn in service. In addition to that, a large stock of standard rolls is maintained for immediate delivery or in exchange for rolls sent in to be reground. The Bank includes all Standard U.S. threads from 8 to 32 pitch inclusive.

Sheffield **would like to send you new literature describing Crushtrue grinding and its outstanding economic advantages.**

Thread and Form Grinders
Microform and Visualform Grinders
Gear Chamfering
Burring and Burnishing Machines
Crushtrue Rolls and Fixtures
Special Machine Tools

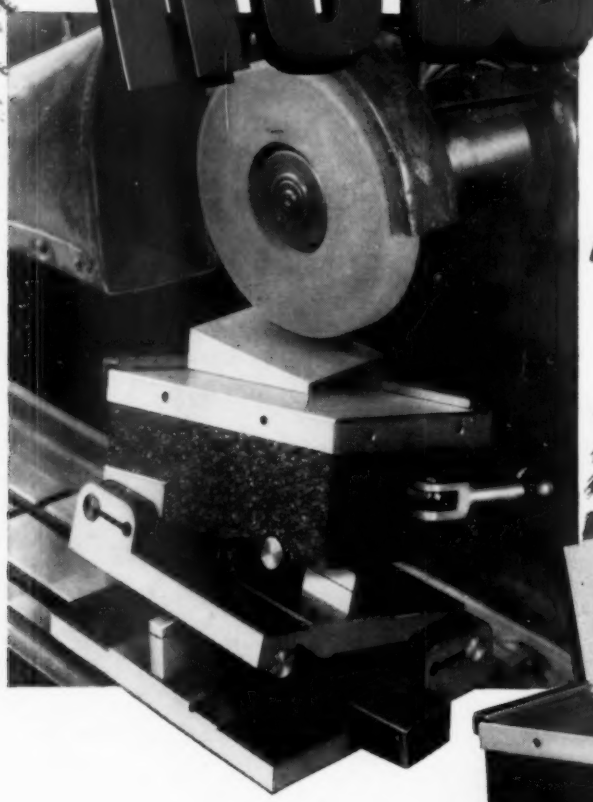
MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS

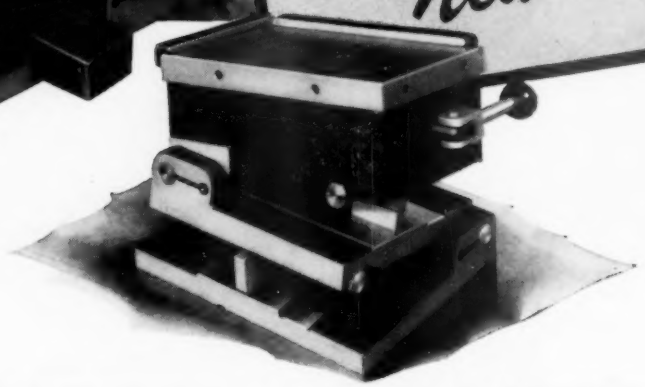
the *Sheffield* corporation

Dayton 1, Ohio, U. S. A.

2982

now the MAGNA-SINE WITH Permanent Magnet CHUCK





SAME ACCURACY New VERSATILITY

CORDS, transformers or other electrical equipment are no longer needed to use the new Magna-Sine . . . the Magna-Sine now is available with a permanent magnet chuck.

The permanent magnet Magna-Sine is not only more convenient to use, it is more versatile, too. It may be used on wet or dry grinding operations. The amount of magnetic power can be adjusted to suit the application.

Thousands of Magna-Sines are in daily use with electric magnet chucks. These units have proved to be the accurate answer for hundreds of precision angular set-ups. The addition of the permanent magnet chuck to the Magna-Sine now makes it the economical unit for *every* precision angular set-up. Write today for prices and catalog. ***Robbins Engineering Company, 318 Midland Avenue, Detroit 3, Michigan.***

Robbins
ENGINEERING COMPANY

Producers of ROBBINS MAGNA-SINE • ROBBINS UNIV-ANGLE ROBBINS SINE PLATE • ROBBINS INDEX TABLES ROBBINS No. 3 DRILLMATIC • SPECIAL MACHINERY